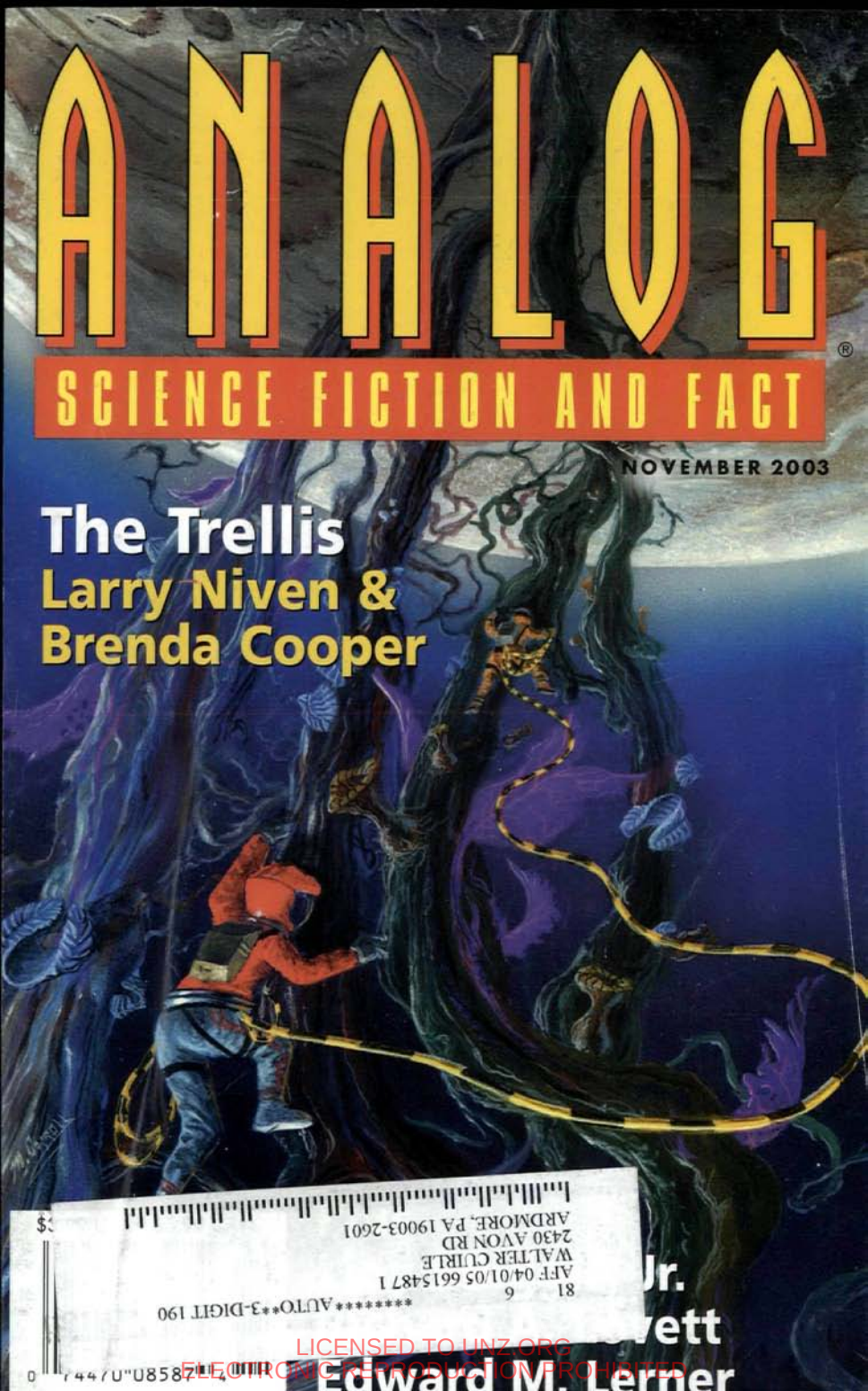

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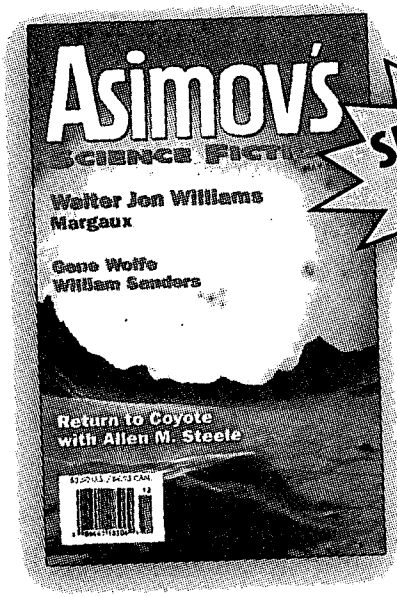

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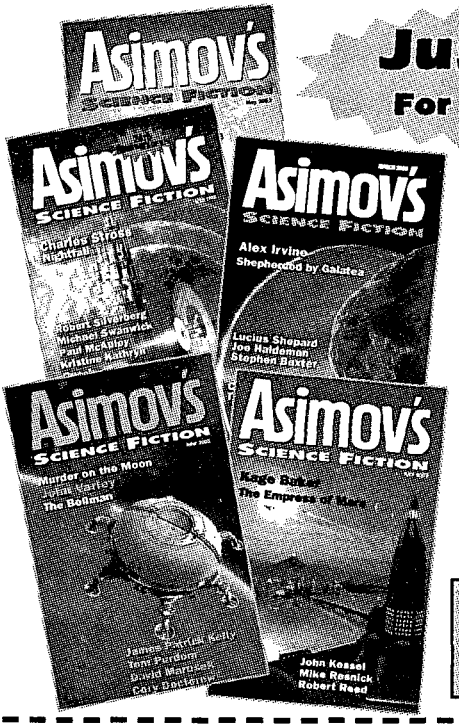

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EDITORIAL Stanley Schmidt

MISSING THE POINT

If there is any principle of the Constitution that more imperatively calls for attachment than any other it is the principle of free thought—not free thought for those who agree with us but freedom for the thought that we hate.

Oliver Wendell Holmes, Jr.

Let's make one thing clear right from the start: this is not about the Iraq War. I say that because I know all too well that some readers will immediately assume that it is. If you're one of them, you're immediately jumping to an unjustified and incorrect conclusion and you should start over and try again. It's not that I couldn't give any opinions about the war itself, but I won't because our production cycle takes several months and anything I said here about anything so specifically current would probably be obsolete by the time it appeared. Conditions will likely be very different by then—most of us can probably agree that we hope the war will be over by the time you read this, even if we can't agree on anything else—and whether it is or not, new considerations will likely have come to light to change my thinking. Furthermore, my expressing any opinion about the war itself, no matter what that was, would so inflame approximately half my readers that they couldn't see what I do want to talk about. And what I want to talk about is a cluster of things that need to be considered periodically, regardless of what wars we're currently in or between, and regardless of where you stand politically.

So I will take no stand on this war *per se*. But I feel compelled once more to talk about some of the ways people have *reacted* to the war, because those seem regrettably timeless. I said similar things during the Grenada Invasion (see, for example, "Loyal Opposition" [May 1984]) and the (First) Gulf War ["The Perils of Victory," Mid-December 1991], but the need never seems to go away for more than a little while.

Again we have factions favoring and opposing the war, and intolerance on both sides. In general, the intolerance seems to be more often blatantly overt from pro-war individuals and groups, but it's not limited to them. I recently talked to someone who had attended a convention (on an unrelated topic) at which almost everyone was strongly anti-war, and not very willing to listen to any suggestion that there might be enough different about present circumstances to make this war a less clear-cut issue than "either" side made it out to be. (There are, of course, far more than two sides; but our language being what it is, it's hard in casual discourse to avoid lumping similar ones into two major groups and talking about them as if they were more homogeneous than they are.) But the lopsidedness of this convention was, as I understand it, more a matter of many people having their minds made up in roughly similar ways and not very open to considering alternate viewpoints, than of anyone actively trying to suppress alternate viewpoints.

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I've heard several cases of that from the "pro-war" camp, like the businessman who posted a huge sign in front of his premises saying, and I quote verbatim: "Protesters Keep Your Mouth Shut." That attitude I find profoundly disturbing, no matter what side of what issue it's coming from. It's one thing to hear somebody espousing a viewpoint you disagree with and say, "I think you're wrong, and here's why; let's see if I can persuade you to see it my way." It's quite another to say, "I think you're wrong, so shut up; I don't want to listen to you, and I don't want anybody else to either."

Those who would forcibly silence the opposition miss the point of what makes this country worth fighting for: the right of individuals to have and express honest opinions, even if they're not popular ones. Ironically, this right applies even to those who hang out such "Shut up" signs, as long as they don't try to force compliance with their wishes. But it's a dangerously short leap from expressing such repressive views to banding together with others who share them to forcibly silence those who don't. As long as that line is not crossed, I can only express my dismay that some people can talk about defending freedom while their actions try to restrict it—and not see the irony in that.

A few days after the feature article about that businessman appeared, the same newspaper carried a letter to the editor echoing his belief that the opposition should "shut up" and adding, "Now is the time to let the leaders of this country (right or wrong) conduct this operation in an uninhibited fashion." When should people let their leaders do what they want, "right or wrong"? Mark Twain had an answer still worth pondering: "Only when the republic's life is in danger should a man uphold its government when it's wrong. Otherwise the nation has sold its honor for a phrase." Again I remind you that I'm not saying to what extent I thought the government was right or wrong in this case. But I am saying that every citizen has a moral obligation to ask that question and answer it to the best of his or her ability—and if his answer is that the government is wrong, to similarly consider the question of whether the republic's life is in sufficient danger to support it anyway. If not, there's a concomitant obligation to do what he can to steer it toward "right."

Of course, with hundreds of millions of citizens, there will inevitably be a great many different opinions about what is "right." None of those citizens has an inherent right to assume that his version should be accepted by everybody else—but supporting a government that you really believe (after due thought) is wrong does the country a grave disservice. Bear in mind that Adolf Hitler's rise to power rested largely on numerous citizens accepting his actions

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even if they thought them wrong. I'm not suggesting that we have ever experienced a similar threat, but I say outright that all of us should keep the historical lesson in mind and support officials and policies we think (not just feel) are right, and likewise oppose those we think are wrong.

Again (in the Iraq War of 2003) we have people on "both" sides failing to make crucial distinctions, such as those among supporting the war, supporting the troops, supporting America, and supporting a particular government. Mark Twain again: "Who is the country? Is it the government? In a republic the government is merely a servant, a temporary one. Its function is to obey orders, not originate them." Or as Abraham Lincoln described it, "Government of the people, by the people, for the people." There can be times when the highest form of support for the troops in a war can be opposing the policies that put them there, and the strongest support for the country can be opposition to a particular administration. No useful purpose is served by "either" side building a straw man, stuffing it with stereotypes, and acting as if it were an accurate representation of everyone on the "other side." Yet letters to the editor of every paper and magazine in the country are filled with exactly that.

We've also seen a resurgence of one particular form of sloppy thinking that I'd hoped my grandparents had seen the last of: holding every citizen of a country responsible for the personal actions of a handful of their leaders. Renaming things "Liberty This" and "Liberty That" was a stupid idea in World War I; it hasn't gotten any smarter with "freedom fries" 85 years later. Neither has taking symbolic actions without considering their actual consequences. Boycotting French wines in this country because you don't like the way the French president voted in the UN doesn't hurt him; unless it goes on for a long time, it won't even hurt French vintners who are trying to make a living—but it does hurt American restaurant owners who have already bought the stuff and can neither sell nor return it. Beating up or maligning Arabs or Americans simply because they are Arabs or Americans goes beyond stupid. It is reprehensible.

Finally, we have those who say you're welcome to oppose the war, but keep it to yourself at least until after the war is over. Well, what good will that do if the

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war (this war or any other) is wrong? The only meaningful time to object to a war is before you're in too deep to be able to get out. A few people started objecting to the Viet Nam War relatively early and were largely ignored. Eventually the chorus grew so big and loud that the war had to stop—after so many casualties and such unsatisfying results that the whole thing left a bitter aftertaste and emotional scars that still haven't fully healed. If so many people hadn't become vocal opponents, might we still be there? If more had yelled louder, sooner, might much of the pain have been avoided?

We'll never know, on this timeline—but any time similar situations seem to be developing in the future, everyone would be well advised to stay as informed as possible, form their own careful opinions, and support or oppose as their consciences dictate. I can't emphasize too strongly that I mean that advice for *everybody*, regardless of where on the political spectrum they stand. And it comes with a corollary: Always keep open the possibility that somebody on the "other" side may have something true and important to say, so you, too, should be willing to listen.

The main point that so many people are missing—one of the main threads in the great experiment of this country—is that everybody has a right to express an opinion, and a moral obligation to do it conscientiously and responsibly. It's no coincidence that you'll be reading this shortly before an election. If you really love your country, listen attentively but critically to *everybody you can*, say whatever you think you need to, and then vote as you think you should. ■

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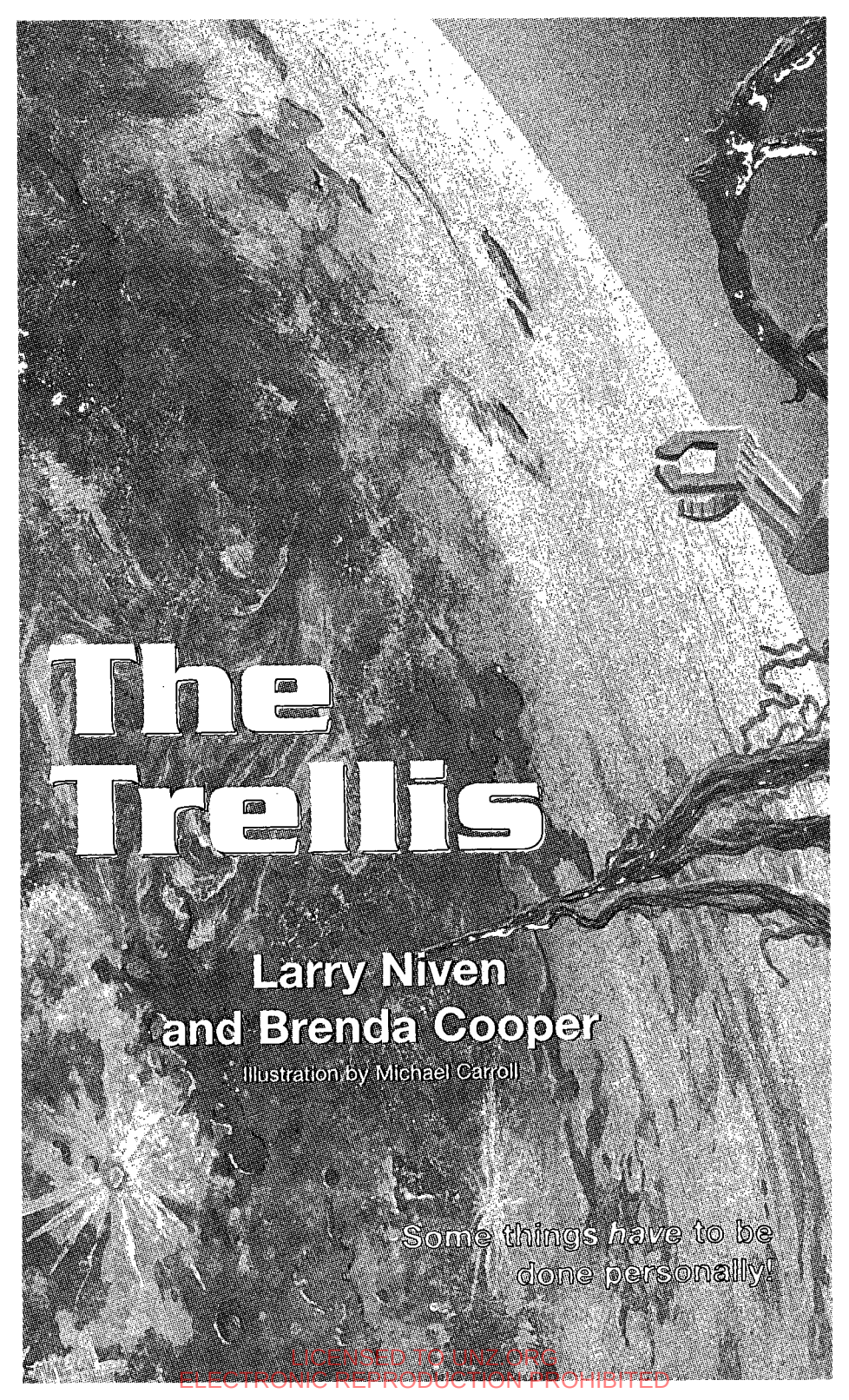

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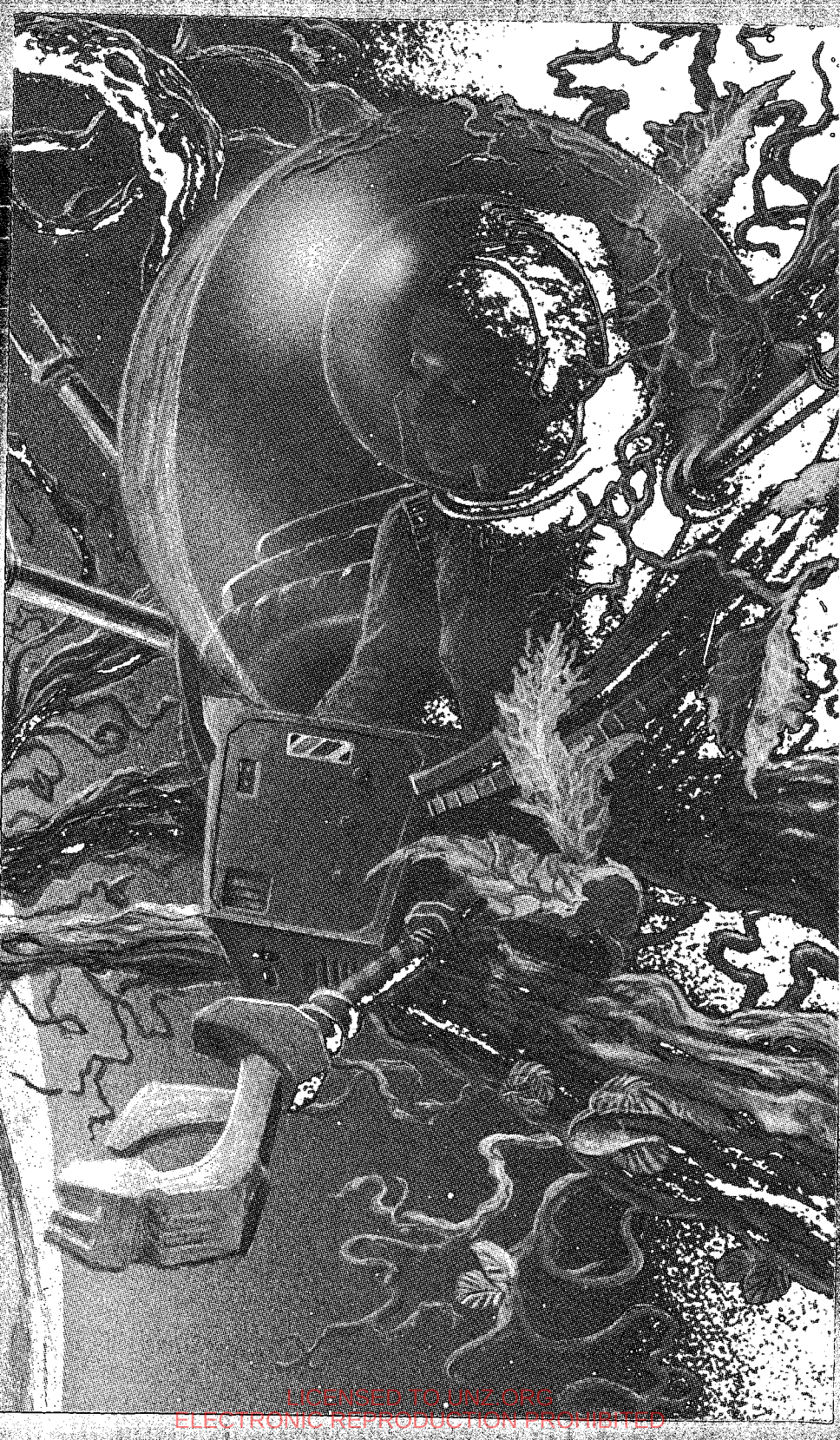

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Kyle refolded the napkins and pulled the tall water drop glasses back towards the plates. Lark wasn't due for two hours, and he'd changed the sign announcing her sixteenth birthday twice, switched placemats once, and dropped a knife on the floor. He paced.

Boot steps. Henry's signature slow shuffle identified him before he rounded the corner into the huge galley. The older man surveyed the perfect table, and his lips curled into a slow smile. "Quit worrying, Kyle," he said. "She won't say so, but she'll be glad to see you."

Kyle sighed. "I haven't been here much this year." Henry watched over Lark when Kyle was visiting Charon. Too often.

Pluto was beautiful as it fell towards the windy dark of aphelion. Crystalline methane and nitrogen clouds sparkled as the light from the base hit them from below, illuminating a gauzy barrier between the frozen surface and the heavens. The clouds drifted across Charon's face. Charon never moved in the sky: directly overhead from where the trellis touched down, a brilliant white sphere where Earth's Moon would have been tiny and flat.

From Charon Kyle could see stars, "A handy thing," he reminded Lark whenever he left, "for an astronomer." On Pluto the refreezing atmosphere hid them. Lark fought him, wheedling and demanding, until he let her stay on Pluto after the changing skies made his work impossible here. The base personnel were her family, and Kyle didn't have the will to fight her. He told himself Little Siberia on Pluto was better for her than the larger and more frenetic Christy Base on Charon. He'd have to watch over Lark in Charon. Here, she was safe. It meant they were separated for months at a time.

Lark worked. Everyone over twelve in Little Siberia base worked.

Lark was sixteen. For years she had been obsessed with the genetically engineered creepers that rooted at Charon and carried water to Pluto's icy but almost waterless surface. It was a fitting job for a student. The creepers themselves had been shaped by a Christy Base school project in 2181, two years after settlement of the Pluto/Charon bases, while the twin planets were still falling toward the Sun and Pluto's atmosphere was rebuilding itself. Now, in 2240, a strange white forest spanned the 17,000 klicks between the two white planets. Named after the mythical river guarded by the boatman Charon, the forest Styx was a writhing mass of wide hollow limbs, translucent spiked leaves, and diaphanous flowers clinging to a Hoyether trellis that spanned the gap between the twin planets. Generations of genetic engineers, most of them students, had nurtured and changed the creepers, giving them a high metabolism that manufactured heat and food, turning them into conduits for food, water, and energy. Manipulating the creepers was rich entertainment for bright minds locked in a frozen system.

The creepers mystified Kyle.

Lark was there now, a hundred and sixty klicks above Pluto base, crawling down toward Little Siberia in her tiny exploration module. Henry monitored her progress, keeping her father's presence at Little Siberia a surprise.

Kyle looked over at Henry. "Did you hear from her? Is she on her way?"

Henry grinned, slow and lazy, not answering immediately. Kyle usually felt like water running downhill past molasses when he was around the older man. He made himself stand still and at least *look* patient. Finally Henry said, "She's on her way. Calm down."

"I haven't seen her for three months. She listens to you. She might not even notice I'm here."

"That's the way of all teens," Henry said. "It's not about me."

Kyle smiled tiredly. "I brought her a present." He produced a box from the nearby table, opened it, and held up a yellow dress with orange and black rib-

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bons lining the bodice and strung through the skirt. Little metal balls hung on the ends of the ribbons. "I got her some leggings, too, so it'll work in Pluto gravity."

Henry shook his head. "Impractical." He was still smiling. "You paid to freight that over, and you're going to freight it away as well? It must have cost a pretty penny."

"Henry—sometimes you just gotta let go and do something stupid. Lark's birthday is today—not after we get to Jupiter. We're leaving in two months. Maybe. I'm competing for a grant to work at Jupiter next year. Lark will need something nice to wear at Jupiter Station. Besides, Chuska Smith makes these. Almost all of us parents with teens pitched in to help her pay the material freight last ship. The kids on Christy Base are excited about moving on."

"Lark isn't."

"I know." Lark loved Pluto. "She'll understand when we get to Jupiter. I'm looking forward to showing her Cassini University."

"You think about every place but here."

"Yeah, well, this is the end, Henry. The end of the solar system, and they're not even planets. Dead end of an astronomy career, too. All the best scopes are on remotes now. There are jobs in Jupiter System, and I have to pay for Lark's schooling. So it's not like there's a choice. Have you decided where you're going yet?"

"They'll let an old codger stay until the last ship. Maybe I won't leave at all."

"You could come with us. Surely they need general repair people at Jupiter Station. Pluto won't be safe in a few years."

"Yeah, I know, maybe I'll be blown off by the cyclonic winds of a dying atmosphere." It *was* a joke—Pluto's atmosphere was barely thicker than vacuum—but Henry's voice was flat and noncommittal, his eyes rolled up so the whites showed. "I'm seventy-three, you know. Maybe I'll hang around as far towards aphelion as I can, and send back data."

"We've got automatic sensors for that. You have to think about what you're going to do." Kyle folded the dress carefully, and set in the box. "Hey, *Mars Adventurer* is scheduled for . . ." he looked at his watch, ". . . now. Join me?"

"Nah. There's enough excitement in my life. Besides, don't you know those are staged? But you go ahead—keep your mind off waiting. She'll be down soon." Henry shuffled off.

In 2240 CE most of humanity had stopped going anywhere. Travel was too uncomfortable. Even if you never left your own planet, there were changing time zones, motion sickness, unpredictable cuisine . . . and security. Security wasn't just to stop terrorists and fleeing tax dodgers; there were plague carriers to be stopped too. Viruses changed faster than antibiotics.

Business could be done via virtual reality, worldwide and further. Social relations could be confined to neighborhoods; dating could be done by VR first. The few who still traveled for pleasure now had a higher calling.

They were called "adventurers." They were loaded with sensors to record everything they experienced. They risked their lives and comfort in ways most folk would never consider, in banned national parks, proscribed religious sites, into volcanoes, undersea . . .

Justine Jackson was the scheduled pilot aboard *Mars Adventurer*. Kyle paid his tourist fee and pulled up a chair to watch the feed. Today Justine was flying an ultra-light glider over the Valles Marineris. The screen took the top half of the east wall of the huge galley. The galley was built to serve a full base; Little Siberia was about 10 percent staffed. It was like being alone in a movie theatre designed for two hundred.

Kyle watched steep red and yellow-orange walls fly by under the glider. He kept one eye on read-outs from Justine's

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body-monitors. You couldn't feel what Justine was going through, but if you could read the telltales, you could imagine. Advanced viewing systems would give motion too.

Suddenly the view spiraled as she did a full 360, a stomach-twisting shift from red canyon to orange sky to red canyon. Justine's heart rate started to rise as she finished the loop and banked into a roll, signaling how hard the trick really was.

One day the suits would record smell and taste.

But real time would never crack lightspeed. Even though the feed was hours old, it was ahead of any news. The familiar tension about whether Justine would fall to sudden death on the floor of Valles Marineris kept Kyle's eyes glued to the screen.

Most top adventurers eventually died.

The screen flickered abruptly to black. Had something happened to Justine?

"Kyle?" Suriyah's voice blasted loudly across the in-base communications.

Kyle blinked, absorbing the abrupt shift.

"Kyle? Can you hear me? There's a problem."

The screen glowed back to life.

He was looking into the Styx. Vines intertwined, moving, a cross between seaweed and woods, deeply shadowed despite light amplification.

The view was from inside Lark's ship. Stems twisted around one of the motorized arms, a leaf flapped across the field of view, barely lit and almost translucent, visible more by how it changed the look of the stars than by itself. The perspective changed to another camera facing the dense center of the forest. Stems and leaves were close here too. Spectral white shapes so thick he could only see two stars, and a rim of icy white Charon. The view jumped again, looking down: vines converging to a point on Pluto's brighter quake-patterned white.

"She's trapped," Suriyah said.

"Trapped?" It dawned on him that as the cameras cycled, he was seeing nothing but more forest. She wasn't up against the Styx; she was in it. "She went too far in?"

"She can tell you herself."

"Lark?" She didn't answer. A shiver ran through him as the images registered. His daughter was stuck a hundred and sixty kilometers above him, caught between worlds in a strange forest.

"Suriyah, I'm coming." Help would be in the communications room.

Half the twenty inhabitants of Pluto Base were already in Communications. Henry was there. He was looking at the only other child on base besides Lark, a blond ten-year-old boy named Paul. "No," Henry was saying, "See, Paul, if we took a regular transport ship, the exhaust would kill the creepers, and we couldn't help Lark anyway. Transport ships can't dock with a research bubble."

Kyle interrupted, "Can't she get loose herself? Her thruster works, right?"

Paul answered. "She's already tried."

"All right, then . . ." Think. A research bubble was tiny. The hull was transparent, but you had to see around eight extension arms of variable size and their thick mooring points, plus a water tank and the magnetic confinement for a fleck of antimatter in a swivel-mounted motor. In the habitat bubble there was only room for Lark in her pressure suit, and the rest of *Shooter* wasn't much bigger. "She could use the arms to grab onto a transport and let it pull her loose."

Suriyah noticed Kyle's arrival. "No, Kyle, she's too deep. The vines have been growing around her since she got trapped." She stood next to him and put an arm on his shoulder. Her dark eyes were smoky with worry. "You'd better talk to Lark." She pointed at the bank of observation screens.

Kyle stepped closer. There were images he'd seen from the galley. Another was Lark, using the video link. Her face was pinched, angry.

"Lark?"

"Dad? You're on Pluto?

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"It's your sixteenth birthday."

"Well, then, I'd better get down there," she said dryly. "But first, I seem to have gotten the marble stuck."

She could have sounded happy to see me here. Kyle had nicknamed the bubbles 'marbles'—they were clear and round, and the most color was always the observer inside. They had become *Shooter* and *Cleary* when Kyle and Lark talked about them. Lark fitted into *Shooter* like the egg in an eggshell. Her pressure suit was painted as a gaudy Earthly sunrise, primarily bright yellow. It was plugged into *Shooter's* systems via a thick umbilical. Within the fishbowl helmet her black hair was pulled back so tightly her dark eyes looked asian. She'd painted yellow streaks into her hair.

"Are you hurt?" he asked.

"No. Twitchy. I broke one of the big grabbers trying to get loose. One was busted already, you know. *Shooter's* older'n I am. Two grabbers are twisted up in creeper. The little grabbers are useless. I'll ruin this damned thing if I keep trying to power out of here."

How did she get a round ball caught in a forest of long vines? A ball festooned with mechanical arms and sampler tubes . . . "Can you go a different direction?"

"I tried backwards and forwards. I'll shoot for a roll next, I guess."

"You can ruin all the grabbers you want, honey. Just don't hurt yourself."

"Duh."

Henry contradicted him, "Lark, if you break off an arm, you'll breach the hull. Stop wiggling the ship randomly. And go to voice-only."

The screen images froze. "Got it," Lark replied, her image in the screen suddenly frozen with an angry, determined look on her face.

"Don't do anything until we tell you," Henry said. "Think about conserving power. You can turn the video on again when we have a plan."

"Stay calm," Suriyah said, "Breathe deeply, slowly. Relax. Go easy on your water."

"I was fully stocked when I left. That's power and food enough for days."

"Ten of them, if you're careful," Henry said. "We'll have you back in time for your party. But that's no excuse for waste."

"A-okay. Think I should try for the roll? I can use the little adjustment jets."

"Hang on and let us analyze for a bit." Henry clearly had control.

"You'll be fine," Kyle said. "We'll think of something." His stomach was a knot and his fingernails bit into his palms. "If nothing else, you can climb down." No, wait, those ten days worth of air and water were in *Shooter!* Not the suit!

"Dad, the door's jammed. I've already tried getting it open."

"I'll be listening, Honey," Henry said. "Just relax and stay available for questions." He turned off the feed that sent the general conversation to Lark.

Paul edged towards the monitors and looked at the one with Lark's image still frozen on it. "Will she die?" he asked.

Henry put a hand on the boy's shoulder. "Not if we can help it." He squatted to Paul's height. "It's a tough situation. She'll have to get herself free somehow. You and I can help Lark figure out what to do."

"Can't we take the other marble?" Kyle interrupted. "I could use the arms to tear my way in—"

Henry shook his head. "The thruster died last week. It's not repairable. I ordered another one, more advanced. It'll be on the next ship, the one you're supposed to leave on."

Kyle winced. More things were breaking and less was being done to fix them as the base lurched towards the end of its useful life. He had no idea what to tell Lark to do. "Lark, can you tell me exactly what happened? I'm sure you said, but I wasn't in here to hear it. It's hard to visualize without outside cameras."

"Suriyah sent a remote cam right after I called her. But it'll be thirty minutes; it had to prep itself before it launched. The left-side grabber broke months ago. Hen-

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ry and I tied it down. I checked it before I went out. It's even on the ship-check sheet since it's been trash so long."

Kyle looked at Henry, who sighed.

"Well, it *was* tied down, I checked! I was going to the midline of the Styx. You got the vines growing in both directions, Dad, and now it's weaving a kind of net. It looks really good. I'm trying to study the autotrophic processes in the healthier plants. Something is . . . changing; they're becoming more active as we get further away from the Sun. You'd expect them to be slower since it's colder. I want to understand before we have to leave."

Suriyah and Paul were drawing in the corner, looking at the stilled video images and working on a slate. Their whispering was distracting. Kyle moved closer to the mike. "Okay, honey, but how'd you get stuck?" He winced. She hated it when he called her "honey." Sixteen-year-old girls were touchy.

To her credit she ignored the slight. "I . . . I don't know. The arm must have broken free. I got too close. Anyway, a pretty thin leaf-vine got stuck in it, and I wasn't going very fast, but it jerked the marble and shifted my course. That's when the real problem came with the arm; anyway, that's when I could tell it was dangling freely, and since I was still moving it caught more stuff, and then slammed me into a big vine. I tried to use the topside arm, and I . . . I . . . just got it tangled, too. So I decided I'd try and thrust out of here, and I put it at full power."

Lark sounded defensive; she wasn't supposed to use full power in the creepers. "You didn't have a choice, honey." Damn it—there was that word again. What was wrong with him? "It was a good choice, Lark."

"It wasn't good. The marble was too stuck, and the topside arm broke, and I didn't get out. That was when I called Suriyah." Lark was quiet, then she said, "There's a big vine blocking the door, Daddy. It's feeling around the edges, but the heat leakage has it stopped. But I can't even go EVA to cut myself free." There was a tremor in her voice.

"We'll figure it out. Henry and Suriyah and Paul are working on something right now."

Kyle paced. Suriyah had shooed the others out, so only the four of them, and Lark's frozen face, remained. Kyle talked to Lark off and on, encouraging. She was getting impatient. Kyle felt lost. This wasn't fair—they were supposed to be having a party. His fists clenched as he kept pacing, nervous. What was taking so long? Why wasn't Lark already on her way home?

The remote camera was in place, its feed playing on one large wall. As the camera flew closer around *Shooter*, the damage to two of the arms was clear. One was missing half its length. *Shooter* was so enmeshed in creeper it looked like it was purposely tied down.

After two hours, Henry keyed Lark, and said, "Okay, we're ready to go. Turn on your video."

Lark's frozen image had looked angry. The animated face that replaced it in the live feed looked calmer, serious. The whites of her dark eyes were red. Lark didn't show any hesitation as she followed Henry's advice, setting the small directional thrusters to given angles and strapping herself in. There was a limited amount of propellant for the little thrusters; the antimatter was confined for use in the main engine.

Kyle's eyes stayed on the camera feed. There was a puff of propellant release, the burn of the thrusters, and the little marble pushed forward, rotating, pulling the sheet of creeper forest slightly; a tug of war. The tangle of ship and creepers moved. Lark yelped.

She'd turned off the thrusters.

Her voice was quivery, scared. "It didn't sound right. The arm . . . the bottomside arm sounded like it might rip off right below my feet!"

"Damn." Henry swore. "All right. Don't crack the bubble. Damn engineers should've designed the arms to be re-

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leased from inside."

Kyle had never heard Henry cuss. He closed his eyes briefly. "They'll all be retired by now. Can we try again?"

"Sure, but something else." Henry directed the camera feed, again, to almost circle the knot of creeper.

Three more hours, two more failures.

A blast of the main motor fried a path through the vines, but the arms weren't positioned to push the marble backward. Lark's wriggling had put the marble almost on its side, but how could that change the position of the arms? And the vines were growing back into the charred path.

If an arm tore loose, if the shell was breached, Lark still had a pressure suit. That, they decided, wasn't the problem. The problem was shrapnel, if the base of an arm spanged loose under high tension.

By the last try, the room was full again. Christy Base was in on it, engineers and pilots tossing out and rejecting ideas. Paul had been hauled off to bed by his parents, Kate and Jason, and they had come back to watch. Suriyah was crying. "Quit forcing it. That girl is in an egg—don't break it open. She's got time—no need to kill her now. Go eat," she said to Kyle and Henry. "Tell Lark to sleep. Food and rest will help you all think."

Kyle didn't want to go, but Suriyah ignored his protests and Henry showed Kate and Jason the log of everything they'd tried, and asked them to look for other ideas.

Kyle couldn't sleep. He checked on Lark, who was sleeping. He wandered the halls, lost and tired. Finally, he climbed the ladder to the telescope platform on top of the base. The scope was almost useless since the cloud cover had increased over the past five years, but he remembered showing Lark her first view of the Earth from here.

Right now, the sky was unusually clear. Charon was dead overhead, a great black shield still showing details of landscape in the sunlight reflected from Pluto. The Styx rose like Jack's beanstalk . . .

They still couldn't build a beanstalk, an orbital tower, on Earth. Their materials weren't strong enough. But Charon and Pluto were mutually tidally locked—unique within the known Universe—and light enough that a Hoytether had been strung between them. A Hoytether was an array of strands, some left looser than others to take up the slack if nearby strands broke. It already looked like a trellis. And then the games those students were playing with plant DNA paid off, and Styx was born.

Kyle found the bubble in the scope. It hung motionless, huge in the viewfinder, like a soap bubble caught in a white rose bush. Unreachable. His daughter.

He must have dozed. Henry's hand poking him startled him. "Jason said you were up. I thought you'd be here."

"This isn't going to work, is it?"

Henry climbed the rest of the way up the ladder and slowly sat down on the observatory floor next to Kyle. The only light shone up from the door where the ladder came in, and the semi-darkness somehow made Henry look even older than usual.

"Did you find her with the scope?"

Kyle nodded.

"I'm afraid to force her free. It's wasting power, and I don't trust that little marble."

Kyle pictured Lark dying slowly over days, alone, knowing she was dying. "When this happened, I thought it meant she'd be late for her party. I thought she was irresponsible." He twisted his hands together, stretching his long fingers, fidgeting. "Can we cut her free from here somehow? Do we have any remotes that could do that? Can we make one?"

Henry pursed his lips. "She's all tangled up. Good chance of cutting her free and having her float off into space, unable to steer."

"There's no way to repair the other marble? You're sure?" Kyle asked.

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"I'm sure."

"Can we try?"

Henry looked at him gently. "We can try something—I just don't know what yet. Keep thinking."

"She can't climb down to us."

Kyle jumped up and started pacing again. "Can I climb to her? Cut her loose?"

"It's a hundred sixty klicks and a bit." Henry cocked an eyebrow. Both men were quiet for long moments. "We have ten days."

"Damn. No, it won't work. She'll run out of air on the way down."

"She can plug into the vines. She just can't do that with the suit she's wearing. We'll have to modify a suit and bring it to her."

It had stopped sounding impossible. A hundred sixty kilometers straight up, in low and dwindling gravity . . .

"It will be a hard climb. I'll go."

"We'll both go," Henry said.

Climbing with Henry would be *slow*. "Can you to stay in communications and direct the climb?"

"Jason can direct. I'm going." Henry stared up at the huge telescope. "I still pass my physical every year. I know more about what might work out there than you do. You need me. So does Lark. And two people have a better chance of getting there than one. What if you get out there alone and you get tired or hurt?"

"I'm in good shape!" Kyle protested. "I work out every day." He'd be fifty in ten weeks.

"It's going to take more than physical conditioning to save Lark." Henry didn't have to say she was more likely to listen to him than to Kyle.

"It's going to be one hell of a climb. It will take endurance."

"And brains."

Kyle sighed. "Okay. So I have endurance, and you have brains. Is that it?"

"No, I have more experience in the Styx."

"I'm in better shape."

Henry didn't even seem to hear him—he was looking up through an observatory window, where the interworld forest floated above them.

Suriyah fought them, convinced both men were crazy. "You will die out there! Find another way. That vine is alive—I tell you it's alive. It suffers us to study it, but it will not let you climb it." She stood over the little altar she kept in a corner of the galley and recited a prayer to Kali and burned sandalwood incense. Afterwards, she refused to talk to them for hours.

Lark was silent when Kyle said he was coming to get her. "I'm bringing Henry," he added.

"See you in a few days." She turned off the video abruptly, freezing her picture with a blank expression on her face. He couldn't tell if she was happy he was coming for her, or what she thought about Henry coming along.

Kyle turned off the frozen picture.

Preparing took two long days, and many conversations back and forth between Little Siberia and Christy Base. Kyle was tired and frustrated. Lark was quiet for hours at a time. Since the video was almost never on, he couldn't really tell how she was doing.

"There's more damn gadgets in this suit than any sane engineer would've designed," Henry complained.

Kyle stepped back to check the way the suit fit on Henry. It was an Adventurer class suit, left behind after the initial run of programs broadcast from Pluto had lost ratings in favor of faster and more deadly endeavors. Originally made for someone with wider shoulders than Henry's, it fit well otherwise. The ankles were baggy. Considering the work they did, the suits were a miracle. But they were still two inches thick everywhere, full of sensors and smart chips and wires and air tubes. Henry looked bulky and awkward.

"It'll do. You might be grateful for the help."

"I will *not*." Henry hated using the ad-

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venture suits. "Damn parasites. People who won't go into the world on their own want to ride our dangers. Let 'em make their own dangers."

It had been Paul's idea.

Kyle had been fetching something for Henry when he passed Paul in a hallway. The boy had looked up and said, "You're using the Tourist-class suits, right? Let's broadcast it! It'll be like *Real Space Dangers* when they saved the crew of the *Orpheus*. You'll be heroes!"

Kyle remembered the river rafting show where Han Davidson had been sucked into a sinkhole. Endless views of dark, swirling water while Davidson drowned. Kyle mumbled something noncommittal and kept right on going to find the saw blade he was looking for.

Paul interpreted that as assent, and arranged for network coverage before Kyle had a chance to talk to Henry. They would have taken the tourist equipment anyway. The suits had pockets and belts and straps to let the men take their fill of tools, and they had been designed for a thin atmosphere. They were flexible, versatile. The equipment *was* outdated compared to current adventure suits, and *of course* there were too many readouts and controls, but far better for this venture than the standard surface suits.

Audience thirst for real adventure shows was high; live rescue of a lost maiden would be popular. Now that the networks knew about the rescue, and the suits, they threatened to refuse access to the communications gear if they didn't get to broadcast. Henry wanted to take the suits anyway, and let the networks sue them. Kyle pointed out that he needed to publish to survive, and he needed the networks for that. Besides, money from the networks beat a lawsuit. Jason had the common sense to improve Paul's original wide-open offer and bargain real money for Henry, Lark, and Kyle, as well as support pay for the other people living in Little Siberia.

"When we get back, Paul gets assigned kitchen duty for three years," Henry said.

"He won't be here for three years. His family is leaving on the next ship with us. So give up and focus."

After a final suit-check, Kyle and Henry stepped into the lock, towing nets of gear behind them. They sweated inside the slick suits. The outside temperature was -235C. It took twenty minutes for the base computers to decide the suits had adjusted enough to open the door. They were still sweating when they stepped out onto the sea of ice surrounding Little Siberia. To their right, solid and clear methane crystals the size of houses were half-covered with blown ices and snows. Paths to the left led to Creeper Fields.

Henry followed Kyle a half-klick to where the Styx met Pluto.

Vines overflowed from the sky to add layers of dying material to the methane and nitrogen ices that covered Pluto. Creepers dug in, and ran along the ground like frozen spaghetti. They piled up onto each other, dying together. Methane snow crystals danced in the air around the wide white leaves. Wherever the leaves or flowers made contact with the surface they turned brittle and broke as the men stepped on them. Here and there a vine twisted near the surface, not yet trapped and frozen, as if the Styx harbored snakes.

The base team had guided some of the vines to supply the base. Water and oxygen were needed, and plant broth made good fertilizer for more palatable crops. Years ago they had turned most of the vines back onto the trellis, so that the jungle was growing back into itself, back toward Charon, thicker every year.

Vines and stems fanned out across the trellis as they neared Pluto, and stray vines still piled up on the ice. Kyle wondered if the plants were seeking trace elements. Any such would be buried deep; these surface snows had rained out of the sky, over and over during Pluto's 247.7-year cycles, plating over anything that resembled soil. The plants would

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have to dig deep.

They walked and tested and checked, looking up to see how the vines tangled amongst each other. They selected a medium-thickness vine, wide as their thighs, and well anchored in the ice. It had no leaves for at least the first few hundred meters.

They tested their siphons. There was pressure in the vines. Kyle and Henry could get liquid oxygen, water and plant broth into the suits using modified siphons Henry had jury-rigged from insulated pipes. It was slow. The siphons used tiny valves and bladders to deal with pressure differences. Liquid slipped through chambers to reach reservoirs in the suits.

The Styx fed on solar wind, on water from Charon, and on itself. Oxygen and carbon dioxide swirled through the leaves. Parasite bacteria covered the leaves, turning oxygen to carbon dioxide. The creepers ate the CO^2 and replenished the oxygen. Sunlight became sugar for broth.

The suits *moved* all the time. What was doing that? All those tiny cameras, IR and UV and radar, zoom and fisheye, pressure sensors and medical readouts and who knew what. The sensation was unsettling.

Jason and Paul lumbered across the ice in a small drive-all, and watched Henry and Kyle load supplies into a closed basket that would carry the supplies up, buoyed by a circle of remote-controlled probes. The probes weren't designed to carry any weight at all. Twelve harnessed together could manage thirty kilograms and still maneuver. Every kilo over that was a trade-off in risk vs. material. The basket contained an extra suit with attached color-coded siphons for Lark, a long knife, a single shared habitat to sleep in, extra rope, and a med-kit. There was just enough rope that the basket massed just under thirty kilograms. To save power, the basket would follow them at the end of each day's hike.

"Suriyah's right," Jason said. "You're both crazy. I love you for it. Get that girl home so we can celebrate her being sixteen." He touched them both—the suited version of a hug—and said, "Good luck."

"Thanks," both men answered in unison. Paul waved and made a 'camera rolling' gesture. The adventure suits were broadcasting.

Kyle responded to Paul's cue, saying "Welcome, audience. Jason and Paul just wished us luck. Luck would make a nice change." He thought he sounded stupid and campy.

Calvin Paulie was taking the first turn monitoring and splicing the feed from Christy Base on Charon. Watchers were tuning in from the near parts of the outer system, and an edited version was scheduled for consumption by sunward planets and moons and bases. "Good luck to our adventurers, Kyle and Henry," Calvin rumbled, "as they take off to climb the mysterious and dangerous creepers of Pluto and rescue Kyle's daughter, Lark."

Unexpectedly, it seemed like private pain was being made too public. Kyle winced and stepped back. He gestured to Henry. The slower man would set the pace.

Henry reached for a stem with both hands and tugged on it. As Henry put his weight on the creeper, it demonstrated elasticity, pooling at his boots. "So far, so good," Henry mumbled, and took another handful of the thick stem. He pulled hand over hand until the creeper took his weight. Now he was actually a half-meter above Pluto's surface. Finally, the creeper seemed willing to let the men climb.

"Henry," said Kyle, "remember not to grab the trellis itself, ever. It's too strong. It might cut your suit."

"It's also pretty close to invisible," Henry puffed.

A fifty-foot insulated Kevlar rope separated the two climbers. Kyle waited. When Henry was near the end of the rope, Kyle grabbed a handful of stem and

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succeeded in pulling Henry halfway down. Calvin's voiceover played in Kyle's radio. "Looks like a rocky start," he said, "Or a ropy one. We're wishing you well." Kyle ignored him, reaching for another boot hold. The vine only compressed a little under his hands; it was hard to grip. It *grew* as he held it. The wrong direction. Down. The Styx grew almost a kilometer a day. Of course, Lark and *Shooter* would be moving the same direction. It was like trying to climb a cross between a down escalator and a living boa constrictor.

Henry had modified the toes of their boots; they sprouted tiny steel barbs which helped keep their feet anchored to the stems. Liquids from inside the plant swelled out and froze to the surface whenever Kyle dug his toes in too hard.

There was little gravity to fight, but balance and grip were challenges. It got easier, and in five minutes they'd actually gained thirty meters and found a rhythm.

Lights from their helmets bobbed up and down in Pluto's dusky mid-day.

Half an hour passed. Calvin broke in twice with inane questions, and Kyle hissed at him, "Quit distracting us."

"I'll need some good footage soon."

"Take all the footage you want. You can listen to us, and use our lights and cameras and take pictures of us. Just don't talk to us yet. This is harder than it looks."

Kyle followed Henry's boots. Pluto's surface had just enough pull to establish a definite down, and not enough to make the climb *hard*. They could almost walk up the vines. Rather than a hand-over-hand pull, it was a scramble.

They passed clumps of long leaves, each leaf longer than the men were tall, similar to plants found in the seas of earth, but bigger. Much bigger. Climbing between them required care with the rope. Even though they were near the edge of the forest, leaves or loose stem-ends from neighboring branches periodically undulated past them. Everything moved and grew.

From time to time Kyle missed a step and had to catch himself. That was when he knew how tired he was.

Just past the third clump of leaves, Henry called back, "Okay, stop a bit."

Stopping meant sitting on the creeper stem with thighs clamped tight around it. They faced each other. Kyle's view was towards Charon, and the Styx looked like a river from here—a great thin long silver line. It was almost a kilometer wide, but the perspective and length made it look much thinner—like thread going towards a thimble.

Calvin said, "Nice view. How was the climb?"

"A walk in the park." Kyle didn't want to say how hard it was. He watched Henry's face in the clear helmet. He was frowning. "What's wrong?"

"We're not moving fast enough. We've been going a half-hour, and we're—what—a kilometer up?"

Kyle looked around. The camera probe that had been following them bobbed in space to his left. Pluto was closer than he'd expected. He could see Jason and Paul standing at the foot of the beanstalk, looking up. They were small, but he could make out movement.

"Actually, you've made about eight hundred meters," Calvin replied before Kyle could respond at all. "With rests, that means you'll take about an hour and a quarter to go a kilometer. Roughly eight days if you don't sleep."

Henry snorted.

"So we have to go twice as fast?" Kyle asked.

"More. We lost two days getting ready. That means there's eight left. If we calculated everything right. That's not enough. We need time for surprises, for rest, and maybe some time when we get to the marble," Henry said.

"The forest is thicker down here, near Pluto. It thins out above the atmosphere."

"It won't make that much difference."

"So how do we go faster?"

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"I'm thinking," Henry said. "Meantime, let's restock." The stems were designed as conduits, with at least three veins running through each stem; one for water, one for air mix, and one for a form of liquid energy both humans and plants could consume, dubbed "plant broth."

Leaves always grew with one anchoring structure in the pure water vein, one in the plant food. The broth fed the stem itself, fueling super-fast growth. This was what they plunged their siphons into first. Kyle's suit filled with a cloyingly sweet smell as the thin gel filled a pouch in his lower back. It took time; fifteen precious minutes. As he pulled out the siphon and stuck it back in, fishing for water, Kyle asked Henry how well he balanced.

"As good as the next guy, I guess."

"It's a way to get there faster."

"Huh?"

"Walk. Lean back against a rope and walk vertical. We've both been using hands and feet. I bet there's a walking pace that won't need that for one of us—as long as there's rope between. Let me lead. I'm stronger—I can go faster. I'll hold on. You walk—use the toe stabs. Let go with your hands and walk."

Henry smiled at him. "Worth a try."

It worked better; not twice as fast. They kept going for an hour, Kyle leading, using his hands and feet, arms and legs, back and belly . . . he was feeling the strain everywhere. Henry walked behind. Once Henry came loose, falling outward and down, and Kyle had to clamp his legs around the thick stem, brace for the jolt, then reel him in. Henry just grunted and suggested Kyle get on with it. It was more bravado than Kyle expected from Henry. How much were the cameras affecting the older man?

They stopped once, refilled their supplies, and kept going, Kyle on point again.

They changed stems at a cross-point. The new one was thicker, easier to balance on. Even with periodic leaves to step over, the pull and step, pull and step, pull and step made a cadence in Kyle's head. His lower back screamed misuse, and he needed distraction. He imagined words to the cadence—"Lark be safe . . . Lark be safe." It was almost a mantra.

A knot of leaves and tangled stems stopped them at the ten-kilometer mark. Long streams of flowers spread out around the knot. If it weren't an obstruction, it would have been beautiful. They'd have to climb over and somehow pick the right stem. Henry sat. "Hey kid, time for a break."

"We haven't gone far enough," Kyle said, easing onto a spot where leaf met stem, hooking a leg over a leaf. "Stopping is crazy." At least Pluto finally looked further away. He stared down on the top of Little Siberia and picked out the observatory. "Let's push until we make at least sixteen klicks. We need twenty-five klicks."

"Ever run a marathon? If you sprint the first five kilometers, you never make the end. Besides, it's time for a word with our sponsors."

Henry wanted to talk to Calvin?

"Calvin?"

"Yes?"

The camera probe had stopped too. "Calvin, can you pan the probe cam and give us directions? I want to end up somewhere near Lark."

Kyle eyed the knotted mess of growth. Styx looked like a close-knit weave of plant life, but there were gaps. The long strings of forest moved and twisted and intertwined, constantly knotting and shifting. Silver threads of carbon fiber trellis flickered in and out of view. Choices had looked simple from a distance. Here, tangles and obstacles were everywhere.

Meanwhile, Calvin described a full incident support team assembled—virtually—at the currently nearest Trans-Neptunian object, Kiley3, mere light-minutes away. He described doctors, climbing ex-

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perts, psychologists, child psychologists, biologists . . .

Henry interrupted. "So did you scrape everyone on Kiley3 into your support team?"

"They're getting paid. Thought you'd be grateful. They're not all *on* Kiley3—"

"I'm grateful," Kyle said. They might be able to use the help.

"Want to be introduced?" Calvin asked.

Henry shook his head. "I'd rather have visuals of the best path out of here."

"Dr. Yi is working on it. In the meantime, Dr. Gerry thinks you should have at least a twenty-minute rest. That's time to meet everyone."

Kyle suddenly understood why Henry was being so irascible. A hot thread of anger mixed with his worry about Lark. He checked: they had enough water and broth to last a few hours. He withdrew his siphon from the stem, making sure Henry saw him. Henry winked, tucked his siphon carefully into a belt pouch.

As a concession to their need for rest, Kyle let Henry lead.

"But . . . but you haven't met the team yet!"

Henry spoke for them as he reached up into the knot, grabbing for a writhing stem. "It's not your little girl up there. *Do not* slow us down to entertain your viewers."

To his credit, Calvin shut up and produced Dr. Yi, who guided them across the knotted region without a hitch. "So now you understand the relationship?" Henry asked.

"We'll help you any way we can. But you *should* meet the team."

A kilometer further on, they did stop for rest. Although he knew Lark was descending at the same rate, the sensation of slow movement as the vines below them grew and wriggled and twined toward Pluto was strange. Starting again, Kyle realized how much his shoulders and arms hurt. Hundreds of the same motions wore on muscles. They got to twenty klicks before exhaustion won. Half a kilometer higher, they found a good place to anchor their habitat. They stopped and called for it, waiting.

Their suit radios could talk to Lark from here. "Lark, how are you doing?"

"Hi Dad, Henry. I can see you on the feed from the probe-cam. Wish I was out there with you."

"Yeah, like we're here on purpose," Kyle said.

"You've got a better view of Styx than I ever had, except for a few minutes EVA. I'm looking forward to climbing down."

"Yeah, I plan on taking *Shooter* down."

"We'll climb. *Shooter*'s dead. Besides, I want to walk the Styx."

"What's so exciting about the Styx? It's actually pretty boring. Kilometers of stems and leaves, and then more kilometers of stems and leaves. Sometimes there's a flower."

"Yeah, well, galaxies are clusters of pretty damned boring stars. Sometimes there's a nebula. Styx is cooler than you think, Dad. I was on my way to some flowers that look bigger and seem to direct the stem float in the forest. That's new behavior. I think the vines are responding to the system getting colder."

Kyle didn't want an argument. He wasn't a total idiot about the Styx. "Well, they use energy—metabolism—lots of it, right? That's how they're supple even out here, and how the water and broth don't freeze."

"No kidding. But up towards the middle there's more activity. More flowers, and I think even color. Styx is changing. I just know it. Whatever's changing above me will grow down to Pluto. I want to get higher."

"How about we get lower first? Like back to Pluto?"

"Jeremy says you're being way too cautious."

"Jeremy?"

"There's a bunch of kids here now. In virt. Tourists. I'm really glad Paul thought of this. The worst thing was being so alone; it's so boring to be still. I'm getting

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cramps too."

Oh. "Stay safe." The round cage of supplies rose over the edge of a leaf, its circle of probes bobbing like fishing net floats. "I better go."

There were too many camera perspectives, and too many helpers. The basket tangled hopelessly one stem over. Kyle frowned. "Now I see how she got caught. Maybe I should quit being mad at her."

Henry stared thoughtfully at the supplies dangling just out of their reach. "I'll belay you."

"Great."

"You're the young strong buck."

Kyle grunted, mimicking a baboon.

Henry held the rope as Kyle pushed the basket away from its vine trap and spread the probes out again. It was almost free-fall—he went down at a drifter's pace. "Okay—that's as close as it's coming tonight." Kyle retrieved the sleeping habitat from the basket, tucking it under one arm. Henry reeled Kyle back slowly.

It took an hour to figure out how to wrestle the habitat into shape and anchor it. Unfolded, it was a long sheet of metallic fabric anchored between two stems. Henry plugged it into a stem, into the blue oxygen tube. The habitat bucked and waved, sucking in the air, expanding as it warmed the gas. Layers of skin filled one by one—living space, stored atmosphere, insulation, a shell thickening into a walnut shape.

The set-up looked fragile. They climbed in, waiting until sensors told them the habitat held pressure enough to unsuit. As he lay down, Kyle imagined the anchoring creepers growing away from each other as they slept. He didn't really care. Being out of the constant breathing motion of the suit was wonderful.

Six hours later, Calvin woke them with lyrics from the ancient *The Sound of Music*, "Climb Every Mountain." It was ridiculously inappropriate. Kyle wanted to throttle Calvin.

* * *

Four long climbs and three uneasy sleeps later, they were halfway there. Lark spent part of each day telling jokes. Tourists fed them to her, and she fed them in turn to Kyle and Henry. It kept her engaged.

Kyle hated most of the jokes.

He was surprised that he liked talking to the networks. The attention helped him forget aches in his muscles. The audience was a focus and a safety net. He took small risks, and on breaks he talked astronomy. Lark did voiceovers for the audience, telling them about the creepers. She talked to the team on Kiley3. She talked constantly—to Kyle, to Henry, to the announcers. She even took to calling the Christy and Little Siberia base staff "tourists."

Kyle worried about Henry. His face was red with exertion and spider veins showed up on his nose and face in thin red lines. Henry refused to talk much to anyone except Lark and Kyle. It bothered Kyle.

There was no night or morning; Pluto's six-and-a-half-hour day barely noticed the Sun. Kyle counted time in sleeps. This was their fifth sleep. "Henry? How come you're so quiet?"

"Seems like no one's business how we're doing."

"They're helping. I'm grateful Lark's got so many people to talk to. At least we can move. She's shut up in that bubble."

"She's always done all right by herself."

"I could have spent more time with her."

"How's it going to feel if all these people watch us fail?"

Kyle swallowed. "You've always been an optimist. We won't fail. We're halfway there."

"Half our time's gone. We should stop less."

"Can you do that?" Kyle was bone tired. Henry looked like he was going to have a heart attack any moment.

"If we don't make it, I don't want to

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live afterwards. This would be a good last thing to do."

"We'll make it."

"If you get there, and I don't, be careful how you get Lark out. You'll need to use a traditional blade—no lasers or anything—near the bubble."

"You said that when we were loading the basket."

"We should practice next stop, so I know you know how to do it."

Kyle stayed awake a long time, thinking about Henry's words. He started tired the next day. They hit a clump of new creeper, thin stems twining around the wide one they followed. Kyle caught his foot and pitched forward, tangling his arm and wrist in rope as he fell. He slid, feet dangling in empty space, pulling Henry backward so Henry needed both hands to hang onto the creeper while the rope pulled tight from his waist-clip.

Kyle floated free, his suit hissing urgently, venting oxygen to match his heart rate. He held the rope with two hands, twisting his feet up in an acrobat's move, straining to get a toehold on the stem. He felt a snap and give in his lower back, an instant tightening of muscle. He grunted with the pain.

"Whoa there," Calvin said. "You all right?"

"I . . . I don't know."

Henry managed to twist around and grab the rope, holding on to the creeper with his legs. He pulled, hand over hand, slowly reeling Kyle in until their hands touched and he could pull him up onto the stem. Kyle panted, wanted to scream. He couldn't be hurt. There wasn't time. When he tried to step ahead of Henry, he slipped again, catching himself, grimacing. His back was on fire. He didn't dare burn the small store of painkillers in the suit's med supply for a twisted muscle.

It meant Henry had to lead—Kyle walking behind him. The full med-kit was in the basket, inaccessible without a full stop. Kyle chewed his lip and followed Henry, building up a swing that allowed him to move through the pain.

Calvin started talking in worried tones an hour out, telling the men the doctors thought they should stop. Henry ignored him, leaving Kyle no choice but to follow. Henry went on forever. When they stopped, he collapsed across a vine and stared out at the forest.

After a while, Kyle noticed that Henry was sleeping in his suit.

Kyle sat and worried, watching the older man. Lark had a feed from the camera probe that followed them everywhere, and she spoke. "He often takes naps, Dad." She sounded sad.

"I shouldn't have let him come. I should have brought someone else."

"Henry wouldn't have stayed. He'd have followed you."

"Suriyah could have stopped him. She's a force of nature." He didn't mention that Suriyah had thought this was a crazy journey.

"It's okay, Dad. Just let him sleep for a little while. I think I'll sleep too."

"We have to move again pretty soon, honey, or we won't get to you in time."

Her voice was small and cheerless. "How's your back?"

"It hurts. But not as much as losing you would hurt."

"I hope we all make it." It was the first time Kyle had heard Lark openly doubt success.

Kyle stared at stars, picking out constellations. Even eight hundred klicks up, the stars were faintly blurred. In Pluto's thin gravity the atmosphere reached way up, thinning very slowly.

There were few other humans this far away from Sol. He knew it was harshly cold, but he was sweating and the suit's movement was a constant irritation. He found the Sun, no brighter than Venus from Earth, and imagined the billions of people that populated the inner planets and ringed the Earth and Mars. He'd always wanted to make his mark, to be remembered. He wanted to do it by finding something unique in the heavens.

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Early returns based on 'local' watchers indicated their rescue would be heavily touristed. In fact, he thought wryly, ratings would do better if they died. *Not* how he wanted to be remembered. The thought pushed him into waking Henry.

The next three climbs Kyle led again, painkillers making him woozy. They moved too slowly. Lark had about sixteen hours of air left, and they were twenty kilometers away, making just over a kilometer an hour. Calvin mentioned that their ratings were going up. Kyle cussed at him. "Now, now," Calvin said, "I'll have to edit that out. It must be the meds talking."

"It's a nightmare talking. We're never going to make it." Kyle kept pulling, looking behind him for Henry.

The psychologist, Dr. Gerry, broke in. "Sure you will. We're all pulling for you."

"Too bad you're not really here."

"Yes we are. One step at a time. We're there."

"Talk to Lark. Maybe you can do some good there." Kyle flicked off the sound and brushed aside a leaf that was blocking his view.

"Don't . . . do . . . that," Henry said.

"Do what?"

"Don't turn them off. You need them to get you to Lark. Lark's not on this direct path. You're going to have to cross stems a few times. They can help you with that."

"Us."

"You. I'm slowing you down too much." Henry's breath was labored. "Can't get this close and not make it."

"No."

"You'll be faster."

"And if I fall off again? Scotch my back?"

"I can't go any further. You were right to want to leave me."

"I wouldn't be this far without you."

"You won't get there with me. Save Lark. I'll . . . I'll just wait here."

"Can you take stims?"

Henry was quiet for a long time, still climbing. Kyle wished he'd talk. "You're coming. You have to."

"The last thing I have to do is get you to Lark. Slow down, I'll unhitch. I can call up the habitat."

"I'm the one that keeps tripping. You saved me last time I fell."

"Move faster. Maybe I'll keep up."

"You'll keep up—you're on a rope."

Henry collapsed when they stopped for a rest. His heart rate showed that he was still alive, but he didn't respond to Kyle's voice. Playing possum? Kyle didn't know.

He demanded the supply basket. He closed his eyes while he waited for it, counting time.

Calvin was screaming his name. He blinked. He floated five meters from anything. Damn.

"Where . . . what happened?"

"You passed out. Hang in there. The supply basket is almost there."

"Like I'm going anywhere." He checked. The rope was still attached. He tugged. It was tight. The basket was rising up from below him, the probes rising and falling as someone on the ground adjusted course to meet him. When the basket reached him, he struggled to find the medical kit. He pulled it out. As one hand emerged with the med-kit, weight inside the basket shifted. The open door hung down. Whoever was running the remote probes corrected the wrong way, exaggerating the shift. A long knife fell away first, tumbling slowly past, a soft glint along the blade showing as his head turned towards it, touching it with light from his helmet lamp. He tucked the med-kit under his arm and reached for a strap on the habitat as it came towards him. He snagged it, the bulk causing him to turn over, facing away. He twisted, holding the med-kit and the habitat. He needed to close the door. He was floating down, with no ability to move fast. Kyle tried to snag the extra rope with his foot while it went by. The coil fell across his toe, and he pulled his knee in to bring the rope to where he could grab it with a spare finger. It

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slipped off his boot and floated away. Next, the extra suit passed him two meters away.

Lark's pressure suit.

He tucked the habitat between his knees and reached, tried swimming for it. His rope stopped him.

He stared after the suit for a long time. "Calvin?"

No answer.

Of course not, he'd turned off the audio. "Calvin—track the damned suit."

"We are tracking it."

Well, he had the two most immediate things, but now he'd have to carry them. He left the collapsed habitat between his legs, tied the handle of the med-kit to the rope with a butterfly knot, and pulled himself back. The rope was attached to a creeper. Henry was anchored above him with his small belt rope, still out cold.

Kyle tied the med-kit to Henry's rope. He expanded the bulky habitat and plugged it into a vine. For once, there was a good cross-section of vines nearby to hang it on. He pulled Henry inside and collapsed next to the older man, panting. He had ten minutes to do nothing but think while the habitat pressurized. An hour had passed—Lark had fifteen hours left before she'd start running out of air.

He was so tired he could barely get Henry's helmet off.

Henry's vitals looked ragged. He checked with the med-team, and they agreed. Exhaustion. The verdict: no stims. So he'd lost Lark's carefully modified Tourist suit to retrieve stims, and then decided not to use the stims, at least for Henry. He looked up, toward where the bubble had to be.

Henry's face was white, peaceful. Kyle touched him, rolling him gently back and forth. Henry's eyes fluttered open, and a slow smile touched his mouth. "I must have passed out again."

"Something like that." Kyle filled Henry in. "I don't think I have time to go after the suit. I'm going after Lark. You'll be safe here. I'll come back with Lark. The suit she has will get her here. The habitat will keep her alive while I go after her suit. If that doesn't work—if it's gone—we'll just have to go down the slow way while we figure something else out."

"Huh?"

"Creepers are growing down, right? Almost a klick a day. We'll be the first humans to live off broth for two hundred days."

Henry shook his head. "Never make it. The habitat won't survive that long."

"We all have suits. Little Siberia can send us supplies. There's no more Adventure suits, but maybe they can modify something else to tap the vines."

"Go get Lark. Lemme sleep."

Kyle picked his own helmet back up, jammed the stinking thing back on. "Yeah, okay." He didn't have any choices. "Sleep well." He fed the stim-pack into his suit's auto-med reservoir, asked for and received a dose. He watched Henry put his helmet back on, made sure he was secure, and then breached the hab and stepped back into the cold river Styx.

"Calvin—where's Lark's suit?"

"Snagged. Down. Kyle—it went two klicks down."

Time was against him. He cursed the basket, cursed the damn vines, cursed Henry, cursed his back. "Show me." "You can't get there from here by yourself. Not unless you trust the winds to send you after the suit if you dive for it. We don't recommend that."

What Lark didn't have was the modified siphons. There wouldn't be any way to get broth or water or anything into her. All he had to do was get her to the habitat.

He started out fast. Henry's early words about running a marathon came back to him, and he slowed down. But he needed to make over two klicks an hour to have any time to spare. "Lark be safe . . . Lark be safe." He thought about Henry. "All be safe . . . All be safe.

"Play music for me."

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"Huh?" Calvin sounded sleepy.

"Calvin—don't you sleep?"

"Not until you get to Lark."

"Thanks. Play me some music. I need some rhythm to keep going."

"What do you want?"

"Hell, I don't care. Something with a beat." He looked around. "Got some African drums?"

"I'll find some."

Every two hours he stopped for fifteen minutes rest and more stims, doing the equivalent of vine-sprinting in between. The drumbeats helped. His back still hurt. It became a familiar pain, something that kept him awake and aware, gave him a tie to his aching body. Every step was hard.

Lark wasn't answering. The team said she was asleep, exhausted. So many days of living in one place, in a pressure suit, were taking their toll. Four hours passed.

Calvin started peppering him with questions about Henry. A thought crossed Kyle's mind.

"How is Henry? I haven't seen his med-reads for hours."

"We cut you off from everything but you and Lark and us. Don't want to distract you."

"Damn it." Surely Henry was all right. All he had to do was stay in the habitat. Had he checked Henry's water supply? But he'd plugged the habitat into the vine.

The networks had no control over the suit-to-suit-radio. He called to him. No answer. "Calvin, show me Henry's med readings!"

"You don't need the distraction. Talk. You need to talk so we know you're still with us. *Your* med feeds could be showing better, buddy."

Kyle babbled about the time the feeder jammed completely just after the Styx got to Pluto, when a river of vines threatened to overrun Little Siberia. Henry and others had clambered out onto the surface. They'd fed vines back to the Hoytether trellis and set them climbing back toward Charon. Suriyah had stayed out there with him the whole time. Everyone else took turns. The story didn't seem to be coming out quite in order. Thinking about Henry wasn't right; he should be thinking about Lark. Why was she still silent?

"She's not in great shape," Calvin said. "She's alive. We've been waking her up but she isn't staying awake long. She's been taking pain meds too."

"Like father, like daughter, huh?"

"You imagine the sores you'd get sitting in the same place in a p-suit for ten days."

"Yeah, well, I know what mine smells like after ten days."

Calvin laughed. "I bet you do."

"You don't have smell sensors built into these yet?"

"On the newer models."

"It's a bad idea. Calvin?"

"Still here."

How had he forgotten? "Wake up Lark *now*. I don't care how. Get her to fire the main motor for a few seconds."

"Oh, right, we discussed that—"

"Check my position first and see if I'm out of the way. Henry too."

"You're okay. You're almost underneath *Shooter*, but *Shooter*'s tilted. I'll get her to fire the motor, then guide you around to the channel. Hey, Lark!"

He kept climbing. Lark and Calvin negotiated. She spoke too low for his hearing, but she sounded angry.

He didn't see the exhaust itself. He saw a line of pale plants glow brilliantly, dissolve into colors, then explode in flame as heat reached the air veins. It ran for twenty seconds, and when it went off, vines still burned.

"Thanks, Calvin, I can see it myself," he said, and angled around.

He had to pull himself into the forest to reach the channel. The vines were growing back . . . but the going was suddenly much easier.

Kyle pulled up and over a half-charred leaf and stem-knot at an intersection. From here he could see a much bigger knot—and a darkly corroded metal claw,

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like a skeletal hand straining to break free. *Shooter*. The little ship was even more overgrown and tangled than when he'd seen it from the observatory. Flowers had sprouted everywhere, decorating it, making it look like a party bauble. He stopped a second and just looked, his heart flooding with the knowledge that he was going to make it. Calvin babbled in his ear—talk for the audience about how emotional the moment was.

"I'm afraid to go and look," he said. Lark still wasn't responding to him.

He didn't feel his back or his body at all the last kilometer, just the soft give of the creepers in his hands and feet, the balance of his torso as he struggled to keep his center of gravity over the center of the stem. "Lark be safe . . . Lark be safe."

He was within thirty meters of the marble when the vines tangled around it shuddered and jerked up and down. What? Was the knot unraveling?

"Hi, Daddy." Her voice was weak. She was using one of *Shooter*'s arms to wave at him. He breathed out, and then screamed triumph.

Calvin and his crew had spent hours trying to figure out what he should do. He had a belt knife—thin and insubstantial. It easily cut the edges of leaves, and wouldn't even dent a stem. He had a few hours, maybe more, maybe less. He was too tired to make sense of time.

Trying to untangle the ship appeared useless. Nevertheless, incident command had commandeered nearby computers and run thousands of simulations. They led him through the vines, one by one. *Pull this part out of under—there. Yes. And then go around to the other side. Tug. Sure you can. Good. Now—see the one with the longest bell of flowers? Break that off. Pull here. Tie that down.*

In the background, Calvin was talking Lark through a series of checks. He heard her talking back to Calvin, telling him to quit being so pushy, and Kyle laughed.

Kyle had made a new knot of vines, feeding the vines he was liberating from around *Shooter* into it to keep them from simply re-engulfing the bubble. His back was to *Shooter*. He heard a ripping sound.

He turned just in time to see *Shooter* lurch a few meters lower in the thinned-out net of stems that surrounded it. The ends of an arm dangled from above. Kyle had a rope tied to the marble. He pulled himself along it, fast, letting the vine he had been working on swing back towards Lark. It flapped out above the marble, safely out of the way. The door was free. By the time he got there it was swinging open.

His hand took his daughter's hand.

She was almost dead weight. Her boots flopped against the side door as he pulled, but her hands were gripping. He held her under one arm and looked inside. A backpack sat by her chair.

"Bring the backpack?"

"Yes."

"Are you okay?"

"Weak."

"It's going to take her a little while to learn how to move normally," Calvin said.

"How long?"

"We don't know. Some experts say not until she gets out of the suit. Calvin says she's feisty enough to recover faster."

Kyle talked to Lark. "Can you put your legs around me?"

She used to do that when she was a kid. He tucked his arm under her butt so she was sitting against his waist at the side, and she put her arms around his neck.

Well, he had one hand free. Now what? He shifted Lark to the front of him, sat on the stem he had climbed up, and slid. It was slower than walking—the suit material dragged wrong against the stem. The risk was real—if he wore out the suit material there was no fixing it up here. He stopped them, trying to think of a better way. Henry would think his own way out of a problem.

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"Sit on a leaf, Daddy."

It worked. He cut off a long thin piece of leaf, and tied it between his legs and up around his waist. He felt like he was wearing a diaper. The surface was slicker on the creeper stem. It held up until just before they got down to the first big knot, when the leaf shredded under him and he carried Lark to the knot, walking carefully, afraid that he'd launch them into space. Lark switched around to his back and he climbed carefully over the tangle of stems and vines. Cramps were making her whimper.

On the other side, he cut another leaf. He said, "The leaves are a good idea, honey."

"I know the Styx."

It took five hours to get back to the habitat. Lark gained more ability to move, and her hold on him was less tenuous. She still couldn't stand or climb on her own.

When they reached the habitat, it was empty. Kyle had been afraid he'd find Henry dead in the habitat. Or that Henry had left his suit for Lark and jettisoned himself into vacuum and death. The empty habitat was unnerving. He stuffed Lark into the habitat without repressurizing it, leaving her in her suit. He went out and refilled his suit's reservoirs, and sloshing full of sweet broth and water, he ducked back into the tent. Now he pressurized it and peeled Lark's suit off of her. It actually stuck to her calves, ripping layers of skin off so they looked raw. He took his own suit off, and fed Lark on broth and water. She drank more than he expected.

"Where's Henry?" she asked.

"I don't know. Calvin, will you tell me yet?"

"Nope. Sleep."

Kyle barely got the words "damn you" out before he was, in fact, asleep.

The next thing he noticed was the habitat shaking. Lark was able to help him get her suited. She only screamed twice, once for each raw leg. They depressurized, and Henry tumbled in the door, carrying the suit he'd modified for Lark.

"You went all the way down there?" Kyle asked.

Henry sounded weak. "Someone had to do each thing. I knew you had the brains to get her safely."

Kyle grinned. They repressurized and stripped out of their suits. Lark poured herself into Henry's arms, finally looking energetic. Henry looked very proud of himself. His smile was bigger than usual. Kyle stole a peek at Henry's vitals. His blood pressure was way too high, his respiration was shallow and fast. "Sleep, Henry."

Eight full hours later Kyle opened his eyes. Lark was crying, looking down at Henry.

"He's not moving," she sobbed.

"Calvin, what have we got for Henry?"

"Sleeping. Maybe in a coma. He might have had a stroke. We can't tell from here. Doesn't matter—the verdict is he can't possibly make it. Down will be at least half as hard as up."

Lark crawled over to Kyle and cried in his lap. Kyle patted her head and found he was crying too. Ideas and condolences and tributes started coming in. Kyle turned off his radio; Henry would prefer silence. Besides—he wasn't dead. But how were they going to get him down?

"Remember when you sat on the leaves?" Lark said.

"Sure."

"Do we have rope?"

Kyle winced, thinking of the supply basket. "Calvin, do we have rope?"

Calvin's voice. "They refilled the basket."

Lark's backpack had a better knife in it. She led Kyle out to cut off whole leaves. "These are bigger than I needed to get down the stem," Kyle said.

"They're not for you. They're for Henry. They'll cushion him," Lark explained. "We're going to use the spaces, not the stems."

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"Huh?"

"To climb up, you had to use the stems. To climb down, we can do better. We're almost weightless, right? We tie Henry between us. We wrap him in leaves to cushion him if we screw up."

"Hell with leaves, let's use the probes. They didn't have the strength to carry us up, but they could carry Henry down. Then we can use your idea, but we won't have to worry about carrying Henry."

He was rewarded with a rare touch from Lark. "I want to come back," she said.

"Both marbles are busted."

"Climb back."

"You want to do this *on purpose?*"

"There's things I need to know about what's happening here. Besides, the real tourists will need guides."

"What real tourists?"

"There are ten climbers on the next ship. Hundreds wanted to come—they had to do a lottery."

"We're leaving."

"Justine Jackson is coming here."

"I'm content to watch her."

"They're paying a premium." She named a figure.

She could pay for her own school! "Do I have to climb these things again?"

"You're being requested."

Kyle grumbled. Calvin laughed at him. He and Lark rigged Henry carefully in place of the supply basket. They charged his suit with water, oxygen, broth. Kyle tied the med-kit to his back and tied the basket and its other contents to the vine. It would grow home.

Shooter would grow home too, to be stripped for salvage. It wouldn't do to leave its diminished fleck of antimatter loose in the sky.

Henry beat them down by two days. He was at the table when Lark came in for her party wearing the yellow dress. Suriyah must have fussed over the table for hours; everything was perfect.

"Henry, couldn't they find you a wheelchair?"

"This place isn't outfitted for cripples, Lark. Suriyah, you know I can move around. You don't have to keep lifting me."

"I know. Next you'll be climbing the Styx again."

Henry sighed. "No, not that. But—you're going, Lark. And Kyle?"

"For what they're paying? Sure I'm going. This base'll be open a lot longer now. At least until the Styx dies, if it dies at all. Justine Jackson—nice woman, by the way, but a little freaky—she doesn't want someone beating her record in the Guinness Files. She's talking about climbing the full length."

"Kyle? Twenty-seven thousand kilometers?"

Lark burst in. "Yeah, but we'll have a lot of support. Like swimming the Amazon, you take a boat alongside. She did that too, remember?"

Suriyah said, "You'd be years doing this!"

"Team of twelve. *Big* habitat, and a chef. We'll still have a social life. Lark can attend Yale Virtual. Henry, we're still talking, and I'm not even sure she's funded yet, but wow! We'd have a dedicated channel for three years or so, and then chop that back to thirteen hours of just the exciting parts and a voice-over, for reruns."

"Do you remember," Suriyah said, "that the atmosphere is changing? You'll be climbing through hurricanes."

"No, don't sweat the wind. Pluto's atmosphere is thin as a dream and getting thinner."

"You're all crazy. You started crazy." She looked from one to the other, and suddenly smiled. "Can I have your autographs? Some day they might be worth a lot. Here, on this." On Henry's medical readout. ■

Authors' Note: "We learned of the Hoytether™ from Robert Forward. He taught Niven about mini black holes and integral trees. We miss him terribly."

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SCIENCE FACT

MOVING BEYOND

"LIFE AS WE KNOW IT": Astrobiology Takes on "Earthist-centricity"

Richard A. Lovett

Squzztzzs bobbed contentedly on an ocean of liquid ethane. It was cold by human standards—so cold that if you stuck a finger in it, the finger would freeze solid, then shatter like glass if you rapped it on a rock. Presuming you could find a rock to rap it on.

Squzztzzs had never heard of rocks. His world was dominated by ocean. Very cold ocean by Earth standards, but for him it was warm. Tropically warm, for Squzztzzs was vacationing at his planet's equator, soaking up the rays of a sun so distant it was a mere pinprick—when it was visible at all through the dense, cloudy atmosphere that kept his world from freezing solid.

Squzztzzs was more than slightly inebriated—he'd been sniffing hydrogen again: a gas that initially revved up his metabolism, then reduced him to a mellow haze. Mellow, Squzztzzs wasn't fit for polite society, although he'd probably get along well enough with spring-breaking human college students, if they could find a place to meet where one wasn't cooked while the other was frozen.

Too much hydrogen made Squzztzzs flatulent. He emitted a plume of oxygen, then casually ignited it by discharging a spark of static electricity between his first and fifth filamentations. The radio noise that accompanied such electrical displays was how his species communicated, although Squzztzzs' drunken ramblings weren't particularly meaningful—something on the order of, "Boy, this is cool," slurred beyond comprehension. Not that it mattered. Squzztzzs was more interested in the auditory phenomena that accompanied his ability to court incineration. If he did it just right, he could make it call his name. Squzztzzs, went the oxygen flare as it ignited the methane atmosphere. Squzztzzs, squzztzzs.

* * *

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Science fiction is full of creatures like Squzztzzs—wildly non-human entities inhabiting giant planets, interstellar gas clouds, or the hot plasmas of solar coronas. Most are unscientific figments of an author's imagination, based on speculation about what life might be like in a truly alien environment, without too much concern about whether the result is biochemically or thermodynamically possible. Squzztzzs is a perfect case in point. I have no clue how his biochemistry works and no idea how hydrogen might make him drunk—although I'm reasonably convinced that if he can fart oxygen into a methane atmosphere, he could ignite it with suitably pyrotechnic results.

Creatures like Squzztzzs offer viewpoints on alien environments and serve as metaphors for "people" who look different but are really much like us. Traditionally, they were the best that science fiction could do at creating meaningful aliens, simply because biochemists hadn't provided many alternatives to life as we know it. Stories either had to be populated with creatures that looked like reconfigured Earth-life or with Squzztzzs-type individuals so alien they couldn't be explained. But science fiction has spawned a real-world science that takes such questions far more seriously. This stepdaughter field, called astrobiology, even has its own journal, which began probing the question of alien lifeforms in 2001.[1]

One goal of the new science is to move beyond Squzztzzs and his unscientific kin to ask how extraterrestrial life might differ from that which we humans take for granted from daily experience.

There are two basic approaches to answering this question. The simplest begins by realizing that even on Earth, human experience is limited. We're macroscopic creatures who relate best to other macroscopic creatures of approximately our size and kind. "Man's best friend" is a dog, not an elephant or a dust mite, and while some of us may talk soothingly to our potted plants, most of us don't expect the plants to reply.

Our anthropocentricity even causes us to overlook or misunderstand some of our planet's larger organisms. Much touted, for example, is the giant fungus that reportedly spreads across much of northern Michigan. It's often hailed as the world's largest organism, although I suspect that the hunt for enormous fungi is in its infancy, and that larger ones wait to be discovered elsewhere.

Other giant organisms have long lurked under our noses. Aspen groves are a case in point. Although aspen trees produce seeds, they propagate most efficiently by their roots, forming clone-groves that sprawl across entire hillsides. These groves remain linked underground, and in some ways function like single, gigantic organisms. The linkages are most readily apparent in spring and fall, when each clonal group leafs out in unison or turns its own distinct shade of gold.

Viewing aspens in this manner produces a dramatic shift in perception, as a landscape we want to see as a large number of individual trees reveals itself to be a small community of mega-organisms, each containing hundreds of trunks.[2] Even on Earth, "life as we know it" isn't always quite what we've always presumed it to be.

A similar reorganization of thinking may be required to answer a related question: What's the oldest living organism on the planet? If you studied biology when I did, one answer immediately leaps to mind—bristlecone pines. These

[1] The journal is called, simply enough, *Astrobiology.*

[2] The largest known clone grove, named Pando, which in Latin means, "I spread," covers 200 acres in Utah, south of the Wasatch Mountains. See http://www.extreme-science.com/aspengrove.htm.

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slow-growing trees live near the timberline in the arid mountains of Nevada, Utah, and southeastern California, where tree-ring counting has dated some at ages of on the order of 5,000 years.

That's an old tree—but again, we have blinders on regarding what an "organism" might be. In the lowlands below the bristlecone mountains dwells a shrub called creosote bush, which dominates the desert floor throughout much of the Mojave Desert. Creosote is a flowering plant that propagates by seed, but like aspens, it also spreads by its roots, forming clonal rings. Individual stems come and go, but the slow-growing rings persist—and some of them have been estimated to be at least twice as old as the oldest bristlecones.[3]

In addition to their age, these clonal entities have another interesting feature: They are comprised of individual nodes, linked by complex patterns of roots. That means they're capable of signaling to each other. Simple nodes linked by complex connections should sound familiar; that's how computers are constructed. So, for that matter, is the human brain. I'm not going to argue that aspen groves and creosote rings are self-aware, but it would be easy enough to invent a world that gave such entities time to develop some form of distributed consciousness or hive mind. And, it would be a world based on extrapolation from entities we Earthers take for granted: trees, bushes, and mushrooms.

In addition to forcing us to reconsider our assumptions about common forms of life, astrobiology scours our planet for organisms that subsist in ways quite different from the forms of life we commonly encounter.

It turns out that our world is full of such organisms. Many are "extremophiles," which thrive under temperature and pressure conditions that would freeze humans solid, squash us flat, or instantly scald us to death. These creatures aren't all that interesting to the average person because most are microbes, but astrobiologists find them fascinating because they show the ease with which life can adapt to the most unusual places. They give clues as to where to look for life on other planets, and they feature biochemistries based on energy sources different from those of conventional plants and animals.

This is important because the number one thing that an ecosystem needs is an energy input. On Earth the conventional source of energy is sunlight. All of the macroscopic life we're familiar with—trees, grass, flowers, birds, insects, cats and dogs, ourselves—is powered directly or indirectly by the Sun, which, on average, bathes our planet's surface with about 160 watts of energy per square meter.[4] (This is a global, 24-hour average. At high noon on the equator, the energy flux is about eight times higher, while the midsummer flux on a sunny day at 40 degrees latitude, from 9 A.M. to 5 P.M., averages about 600 watts per square meter. At night, of course, the solar flux is zero.)

This energy source is another aspect of Earth life that we tend to take for granted. Before we turn to more exotic energy sources, therefore, let's think a bit more about sunlight and its effect on plants.

Trees, Ents, and Intelligent Ivy

Alien plants need not be green. Ours are because chlorophyll plays a key role in Earthly photosynthesis, but there might not be anything magic about

[3] Aspen groves might be even older. According to the website Extreme Science, fossil evidence has led some scientists to speculate that some groves might have lived for a million years.

[4] From "Basics of Solar Energy," posted to a University of Oregon web site, http://zebu.uoregon.edu/1998/ph162/l4.html.

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chlorophyll. In fact, its discovery on an alien world might raise questions of *why* its plants and Earth's are so closely linked.

Green, red, blue, black, or zebra-striped, alien plants will probably be designed to maximize the amount of surface exposed to the sun. The most efficient possible plant would look like a sheet of dark plastic lying on the ground—totally opaque in the wavelengths used for its photosynthetic process, thin, and spread out to catch as much sunlight as possible without having to support unnecessary biomass.[5]

Not that this ideal is likely to be fully achieved. On Earth, ground-hugging mats of vegetation are at risk of being shaded out by taller plants, and competition for sunlight tends to send plants upward. But once they get "up," they are likely to spread out horizontally, like the canopy of branches of an old-growth forest. On a sufficiently windless world, it would be easy to imagine tree leaves merging into each other like webbing between branchy fingers. The forest floor on such a world might be a very dark place, indeed.[6]

Even on Earth there are places where the thin-sheet ideal holds close to true. Consider pond scum, for example, or the floating leaves of the lily pad. On land, lichens (which are part plant, part fungus) cling to cliff faces in patches of thin veneer. But from a science fiction perspective, an even odder example is cryptobiotic soil.

Cryptobiotic soil isn't soil. Nor, for that matter, is it a plant, as we conventionally understand the term. It's an entire community of microorganisms, some photosynthetic, some not, growing in a brittle, black layer atop the soft, wind-deposited loams of the desert Southwest. There are places where it's so widespread that you can't walk without stepping on it, but generations of people have crunched across it without ever realizing it's alive. Even scientists were slow on the uptake, and it's only because of a concerted preservation campaign by the National Park Service that the word is finally getting out.

If we can walk, unknowingly, on a living surface on Earth, there's an obvious lesson for space explorers. Thin-layer plants might be very hard to recognize. How long would it take explorers to figure out the truth on a barren-looking Dirtworld, where the soil is the only thing that's alive?

Of greater interest is the degree to which alien plants might resemble animals. Many stories have speculated about intelligent plants—including trees or bushes that walk about like Tolkien's ents. There have also been stories about humans who have been bioengineered to produce chlorophyll in their skin. When other people are digging into their sack lunches, these people could sit in the sun and synthesize their own food—a new twist to clichés about "vegging out."

Are such plantimals feasible? Almost universally, stories dealing with them fail to consider whether the ecosystem has sufficient energy to power such creatures. Sure, plants store energy from sunlight, and in theory they might be able to use that energy to think, talk,

[5] This is offset to some degree by the need to minimize water loss (or the loss of whatever solvent substitutes for water).

[6] Alternatively, could the competition to grow ever higher outpace that on Earth? Plenty of stories have posited worlds of immensely tall trees, but what about an always-breezy planet where plants spin a super-strong biopolymer to fly giant leaves high in the air, like enormous kites? There would be a few obstacles to this (how do the plants launch their leaves, or keep them from crashing in a wind shift, and how do nutrients go back and forth between the leaves and the roots?), but they don't seem insurmountable.

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and walk around. But, it takes a *lot* of solar energy to power a large animal.

Most people burn 2,000 to 3,000 calories per day. In round numbers, that's about 100 calories per hour, or about 120 watts[7]—roughly comparable to the amount of solar energy falling on three-quarters of a square meter of sunny terrain. There's a hitch, however: photosynthesis isn't 100 percent efficient at catching that energy. Even fast-growing Earth plants such as food crops are rarely more than about 1 percent efficient.

A plantimal comparable to a human is going to need to cover 75 square meters—bigger than many suburban driveways. A tree can do that, but it weighs a lot more than we do, and would burn energy faster when it moved. That's why Earthly plants don't go on walkabout. Photosynthesis simply doesn't provide enough energy to allow it.

Similar problems afflict another staple of science fiction: the creature that's a true plant, in that it's sessile, but which is also intelligent. In Earthly biology, brains are energy-intensive. Our own require about 600 calories per day to keep active—about one-fourth of our total intake. If its brain works like ours, even a sessile intelligent plant is going to have to soak up about 20 square meters of sunlight, above and beyond that which it needs for normal growth. Sessile plant intelligences, if they exist, will only be found in relatively large organisms.

Careful bioengineering or otherworldly evolution, however, might make plantimals and intelligent plants somewhat more feasible. About 43 percent of the energy in sunlight falls in wavelengths appropriate for photosynthesis, and the process itself has a chemical efficiency of about 28 percent. This means that, in theory, photosynthesis might be as much as 12 percent efficient (0.43 x 0.28). A 100-calorie-per-hour plantimal that manages to achieve half of this theoretical maximum would need to cover only a dozen square meters—roughly the surface area of three or four picnic tables. That's still rather large for human-mass creature, but it might be feasible if the plantimal can spread out into a thin, ground-hugging mat. And there are other ways for a plantimal to make the available energy go further.

- It could follow a diurnal cycle, spreading itself into a big, sunlight-absorbing blanket by day and contracting into a compact, mobile shape by night.
- It could be cold-blooded.
- It could use a more efficient form of photosynthesis.
- It could store energy for short bursts of activity. A forest of plantimals might be migratory, shifting up and down mountain slopes in spring and fall, or moving north and south with the seasonal sunlight. Perhaps the mobile form would be bird-like, hoarding energy for long, non-stop migrations in search of new places to root. Smaller plantimals might crawl around the forest floor, following shafts of sunlight.

Fungus Failures

Plantimals aren't the only science-fictional creations that run into energy difficulties. Worse problems come from stories dealing with fungi.

Earthly fungi include molds, mushrooms, and yeasts, all of which subsist on energy from the bodies of other organisms, sometimes living, sometimes dead. There's plenty of energy there—it's basically the same energy source used by animals (including people)—so there's no *a priori* reason to exclude the prospect of intelligent, mobile fungi (although they might be hard to distinguish from animals). The problems arise when one attempts to create an ecosystem *based* on fungi.

As anyone knows who's ever opened

[7] A food calorie is actually a "kilocalorie," which is 4,184 joules. A watt is one joule/per second.

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a container stored too long in a refrigerator, molds don't need sunlight. Nor do mushrooms, a realization that is at the core of many entertaining but energetically impossible Fungus World tales..

Classically, these stories involve troglodyte cultures—underground societies whose denizens never visit the surface world, and may not even know it exists. In the simplest of these societies, people eat mushrooms or yeast cultivated from recycled wastes (including dead bodies). Unfortunately, this is the biochemical equivalent to a perpetual-motion device, and is equally impossible. With each cycle, the system loses energy, until pretty soon there's nothing to feed the mushrooms—and no mushrooms to feed the people.[8]

Other science fiction worlds and societies can suffer the same fate. These include:

- Dark, isolated planets harboring forest-like ecosystems of giant fungi;
- Post-holocaust tales in which survivors live on canned goods dug out of ancient supermarkets, pantries, and warehouses;
- *Mad Max* scavenger societies in which everyone raids supplies from someone else; and
- Ice World stories in which hunters live on planet-girdling ice sheets, competing for arctic hares and other game with polar bears and wolves.

Ice World is the easiest of these to deconstruct. The moment you ask what the hares eat, it falls apart. But all of these societies are structurally equivalent to Fungus World, because each generation lives off of the previous one, without producing anything new. It's like stuffing your money into a mattress and trying to live on it forever. No matter how big the mattress is, it's not infinite, which means that eventually you run out.

Turning the Lights Down Low

Issues of energetics also apply to our friend Squzztzzs. I didn't say where he lives, but his world looks like a moon in the outer solar system, so far out from the sun that it receives only about one percent as much sunlight as the Earth. Squzztzzs may or may not be the liquid-ethane equivalent of "warm"-blooded, but he's active enough to swim to the tropics from wherever his home is; he can generate electrical sparks; and his metabolism can be revved up enough to waste energy as oxygen farts. For his environment, Squzztzzs is a high-energy creature. He has to eat—and that's where the weak sunlight will affect him.

Unless the seaweed and algae of Squzztzzs' oceans have come up with a form of photosynthesis far more efficient than that on Earth, the wan sunlight means that they're going to be only about 1 percent as productive as Earthly plants.

This sharply limits Squzztzzs' food supply. Perhaps animals on Squzztzzs' world are metabolically geared down to match that weak solar energy; to some extent, the cold environment might facilitate this. But animals have to move, and that's going to take energy, regardless of the temperature. One percent of the average human's 2,400 calories per

[8] Physicists will see this as a reflection of the second law of thermodynamics, which mandates that a closed ecosystem has an ever-reducing supply of usable energy. Biochemists will also note that this system continuously loses carbon dioxide gas from people's exhalations. Spaceship crews eating vat-cultivated yeast will have the same problem, but they have a handy energy source (the ship's engines) that they can use to scrub carbon dioxide from the air and convert it into carbon compounds for the yeast to eat. A sustainable troglodyte culture needs something similar, such as a nuclear reactor, above-ground solar panels, or a geothermal power plant, plus the technical ability to harness the energy for chemical syntheses.

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day is only 24 calories. It takes that many calories to walk a quarter-mile. If we ramp Squzztzzs' metabolism down by a full factor of 100, to match the reduced productivity of his planet's plants, he's going to have to be a snail or a jellyfish. He'd definitely not have enough energy to think, talk, or do anything else interesting. Squzztzzs and his kin are going to need more acres of cropland (or algae farms) per capita than do humans—most likely, a *lot* more acres.

Imagine how different our world would be if crops grew 100 times more slowly than they do. For every acre in cropland today, there'd have to be 99 more. We'd all be vegetarians because we couldn't afford to waste food by feeding it to farm animals. Pets would be rare. Wood would be precious because trees would take thousands of years to mature. Parks and nature preserves would support only 1 percent as many animals as we are accustomed to seeing—and the scarcity of prey would mean that few, if any, predators could survive.

Squzztzzs' planet won't be densely populated. He'll probably eat nothing but plants, and the human taste for meat, milk, cheese, etc., might appall him—or be so alien that he barely grasps the concept. Most likely, he'd be equally baffled by freeway congestion, cities, centralized governments—and even the hordes of mosquitoes that plague visitors to Earth's own tropics. Psychologically, Squzztzzs may be like a college student on spring break, but culturally he's not likely to be all that close to us, after all. And all of these differences derive from the weak flow of energy into his ecosystem.[9]

Squzztzzs, however, still runs on solar energy captured by something akin to photosynthesis. Even on Earth, there are ecosystems where that's not the case—ones that do not run afoul of the Fungus World problem.

Troglodytes Revisited

Biochemically, the Earth has at least four ecosystems that exist without solar energy. All four run, one way or another, on energy derived from our planet's core. Astrobiologically, they're interesting because three of them represent ways in which life might exist on worlds similar to the primordial Earth—and the other might survive on present-day Mars.

The best known of these ecosystems exists in and around ocean-bottom hot springs (commonly referred to as *hydrothermal vents*). Such vents are common in rift zones, where magma squeezes from below in the process of continental drift.[10] A few years ago, scientists discovered that these vents are teaming with life, which subsists on chemicals created when the water came into contact with the magma. The bacteria live by extracting energy from these chemicals via biochemical processes quite different from photosynthesis. Other creatures eat the bacteria. The largest creatures in this ecosystem are colorful, yard-long tubeworms, which cling to rocks near the hydrothermal vents. Long before our planet could support today's dominant forms of plant or animal life, these primitive ecologies could have thrived, leading astrobiologists to wonder whether they might also represent one of the more common forms of extraterrestrial life.

[9] The reverse might happen in a high-energy ecosystem. A Venus-like world that doesn't broil or steam itself into lifelessness might support a riotous growth of vegetation, with teeming animal life to match. Denizens of a world such as this might view Earth in much the same manner as we would view Squzztzzs' planet.

[10] In continental drift, ocean basins break apart along these ocean-bottom rift zones. The sea floor spreads outward from the rifts, while magma wells up behind it to fill in the void.

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Until recently, astrobiologists presumed that this type of mineral-driven ecosystem could only be created by magmatic heat. Then, in 2000, a team led by University of Washington oceanographer Deborah Kelley stumbled on a group of hot springs nearly ten miles from the nearest volcanic zone—too far away to be warmed by magma.[11] Where the water from these springs hit colder water, it produced giant, chimney-like towers of calcium carbonate, up to 200 feet tall, inducing Kelley and her team to call their find the Lost City Hydrothermal Field.

The Lost City is an enormously important discovery. Not only does it exist where no hydrothermal vents were expected, but it supports a biota based on an unexpected energy source.

Conventional hydrothermal fields are located in the deep ocean, thousands of feet below the surface. The Lost City sits atop a mammoth seamount, 18,000 feet tall,[12] and Kelley's team found it only because they were wondering what created that enormous undersea mountain. They now think that the mountain is itself the powerhouse that runs the Lost City ecosystem. The key is a chemical process called *serpentinization*.

Serpentine is a smooth, greenish rock, created from the mineral olivine, which is normally found in the Earth's upper mantle, five to seven miles beneath the sea floor. Occasionally, as at the Lost City, geologic forces squeeze mantle material close enough to the surface for it to come into contact with seawater trickling into deep cracks. Then, the olivine reacts with the seawater to form serpentine.

That reaction has two effects. First, it causes the mantle rocks to swell by 20 to 40 percent—causing the mountain to rise ever higher above the sea floor, like a giant blister. But it also releases energy, heating the water and charging it with chemicals, including hydrogen and methane—a potent energy source for bacteria with the biochemical tools to unleash it.

At first glance, the Lost City ecosystem sounds similar to that of conventional hydrothermal vents. But the chemicals are different, requiring the microbes to have different biochemistries to make use of them. Astrobiologically, an even more important difference may lie in the fact that the Lost City demonstrates yet another energy input for a sustainable ecosystem: the energy released in the process of serpentinization.

As of press time, the Lost City is the only place where such an ecology is known to exist. But Kelley suspects that other Lost Cities will be found in geologically similar regions—possibly including three other undersea mountains within 60 miles of the Lost City. Other sites are plentiful, especially along mid-ocean ridges, where tectonic forces could have brought other large chunks of mantle rock into contact with seawater.

Could this occur on other planets? At a talk at the Fall 2002 meeting of the American Geophysical Union, Kelley suggested that indeed it could. All that is needed, she said, is a tectonically active planet with a mantle similar to ours, and water to react with the mantle rocks. In our own solar system, that might be a tall order. But in other solar systems . . . who knows?

Kelley also suggests that early in the Earth's history, mantle rocks may have lain much closer to the surface. If so, a primitive Earth—and by extrapolation,

[11] "The Ultramafic-Hosted Lost City Hydrothermal Field: Clues in the Search for Life Elsewhere in the Solar System?" *Eos. Trans. AGU*, 83(47), Fall Meet. Suppl., Abstract B62A-03, 2002. The find was originally described in *Nature*, in 2001.

[12] That mountain is called the Atlantis Massif. The name Lost City was chosen, in part, to reflect this.

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other primitive worlds—might have ample opportunities to support this type of seafloor life.

Yet another ocean-bed ecosystem was reported in early 2003 by scientists who'd drilled 1,000 feet into seafloor rocks well removed from the nearest serpentines or volcanism.[13] This ecosystem is too recently discovered for the researchers to be sure how it works, but they speculate that it may be driven by chemical reactions between seawater and hot, underlying rocks, warmed by the normal flow of heat from the Earth's interior. These reactions, the scientists say, might produce hydrogen and petroleum-like chemicals that the bacteria could use as energy sources. Alternatively, the ecosystem could be powered by similar compounds leaching from overlying sediments. The difference is crucial. In one case, the ecosystem is fueled by subterranean heat; in the other, it subsists indirectly on solar energy contained in organic matter that settled to the seabed from surface ecosystems. Either way, the discovery of microorganisms in the rocks beneath the ocean floor is interesting, but its astrobiological significance depends on the degree to which these organisms are making use of a previously unrecognized energy source.

Nuclear-Powered Bacteria

So far, we've discussed ecosystems fueled by the sun, by volcanic heat, and by the reaction of the Earth's mantle with water. But even stranger things lurk beneath our feet. Deep in the mines of South Africa, biogeophysicists have discovered an ecosystem that runs on nuclear power—or, more precisely, on the energy of radioactive decay. Similar ecosystems, researchers excitedly propose, might exist beneath the surface of Mars—or any other planet with a rocky crust.

The Earthly bacteria live in aquifers 13,000 feet below the surface, where the water is scalding hot (140 °F) and contains no oxygen. Geologists estimate that the rocks were formed 2.7 to 2.9 billion years ago. The water may have been there for nearly as long. "The dinosaurs came and went while this water was beneath the Earth's surface," says Tullis Onstott, a geophysicist from Princeton University.[14]

Over the eons, uranium and other radioactive elements in the surrounding rock gradually decay. When the radiation hits water trapped in the interstices of the rock, it breaks water molecules into hydrogen and oxygen. The oxygen reacts with minerals in the rock, such as sulfur, forming biologically useful chemicals such as sulfates. Some of the hydrogen reacts with dissolved carbon dioxide to form methane, but most of it accumulates in the water. It's a slow process, producing less than a nanogram per year of hydrogen in each liter of water. But over the course of a couple of billion years, that adds up to two grams per liter.

For hundreds of millions of years, the hydrogen-rich water remains inaccessible, locked up in cavities too tiny to reach. But when something fractures the rock, bacteria can get at the water to gorge themselves on the stored energy from two billion years of radioactive decay. Geologically, these fractures occur at erratic intervals, from earthquakes and other seismic stresses. In mines, they're induced by the mining itself, and the researchers descend into the mine

[13] James P. Cowen, et al, "Fluids from Aging Ocean Crust That Support Microbial Live," *Science,* 299, 120 (3 January 2003).

[14] Onstott discussed his results at the Fall 2002 meeting of the American Geophysical Union, Dec. 6-10 in San Francisco. See "The Witwatersrand Deep Microbiology Project: Observations Pertaining to Hypothetical Microbial Ecosystems Beneath the Surface of Mars," *Eos. Trans. AGU,* 83(47), Fall Meet. Suppl., Abstract B62A-05, 2002.

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to sample the biota whenever the miners accidentally tap into a new aquifer.

The implications for astrobiology are enormous. Scientists calculate, for example, that the deep rocks of Mars may be warm enough to hold liquid water. If so, Onstott estimates that radioactive decay would enrich that water with about one-fiftieth as much hydrogen as on Earth. That doesn't sound like much, but again, over the course of billions of years, it adds up. Then, a meteorite hits nearby and shatters the water-containing rocks. The hydrogen-rich water oozes into cracks, providing a bonanza for microorganisms that have been lying dormant, awaiting just such a chance. If Mars was ever wet enough to develop life in the first place, a remnant may linger in rocks, deep beneath the Red Planet's surface.

Radiation-based ecosystems could even exist on rogue planets drifting through interstellar space. All that is necessary is for these bodies to have warm cores, so that there's a layer somewhere beneath the surface that's the right temperature for liquid water, and for the surrounding rocks to be laced with radioactive materials. The planet need not be unusually radioactive; it only takes a hint of uranium and lots and lots of time—both of which appear to be common throughout the Universe. Microbes simply need to wait for impacts—admittedly rare in interstellar space—to crack that rock and give them access to the hydrogen-rich water.

Whether any of these subsurface ecosystems could support complex life is a more difficult question. Again, it's a matter of the intensity of the energy source. I mentioned in an earlier *Analog* article[15] that about 3×10^{13} watts seeps through Earth's ocean floor from underwater volcanoes and hydrothermal vents. In total, that's a lot of energy, but it translates to only about a tenth of a watt per square meter.

Compared to the amount of energy reaching the Earth's surface from sunlight, this isn't much—a lot less than Squzztzzs has on his sun-starved planet. But hydrothermal energy is concentrated in tiny zones around the vents. The same applies to Lost City-style ecosystems, or the subterranean radiolysis-powered ecosystems discovered in South Africa.

Some of these energy sources are quite transient—a problem for any organism that can't go dormant to avoid starvation—but at the hydrothermal vents, at least, there's enough time for the growth of tubeworms.

This opens the door to the prospect of larger creatures that subsist by eating the local equivalent of tubeworms. If they were intelligent, these creatures would probably be nomadic, always keeping an eye out for newly opened hydrothermal vents. They might even transport bacteria and baby tubeworms to these vicinities in order to jumpstart a new vent's ecology so they could harvest as much food from it as possible before conditions again change. Such creatures might be very possessive of their food sources, and might not take kindly to Earth explorers poking around, taking samples. And unlike many alien-life stories, a story about this conflict would be one that's well-rooted in the energetics of the alien society. No Fungus World problems here!

59,049 Times More Words

In addition to looking at ecosystems, astrobiology also considers individual creatures, trying to eliminate preconceptions that Steven Benner, a chemist at the University of Florida, calls "Earth-ist-centricities."[16]

It's possible, of course, to imagine life-forms that are truly alien. These might include living planets, electronic "life" that exists only as computer code, and immortal beings whose existence isn't

[15] "The Search for Extraterrestrial Oceans," *Analog*, May 2003, pp. 36-45.

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affected by the material universe. Unfortunately, once we've imagined such entities, we can't say much about them.

We can say a good deal more about biochemical life. For example, Earth life uses DNA (or its cousin, RNA) to encode genetic information. This DNA is comprised of a pair of long chains wound around each other in a double helix. The core of the double helix is the "genetic code" of four nucleotides, typically identified by their initials, A, T, G, and C. Its backbone is a sequence of phosphates that hold the nucleotides in place.

How much of this is mandatory?

Only part, says Benner. To begin with, there's no need for the genetic code to be limited to four letters. Biochemists can synthesize eight additional nucleotides that fit perfectly well into the double helix. This means that aliens could use a genetic alphabet comprised of at least 12 letters, rather than our four.

This trivial-sounding change could have tremendous effect. A 12-letter alphabet carries three times as much information per letter as a four-letter one. That adds up exponentially. With 12 letters, there are 59,049 times as many choices for 10-letter "words" as there are with four letters—and DNA "words" are thousands of letters long.[17]

Aliens that use extra bases in their DNA would either be able to get by with a lot less DNA (a possible advantage in toxic or radioactive environments, where this might guard against excessive numbers of mutations) or it could allow them to encode enormous amounts of extra information. If you wanted to create aliens in which memories are passed on from parent to child via genes, this might be a way to make it happen.

Oddly, the DNA's phosphate backbone may be more difficult to change than the nucleotides. Electrical charges on the phosphates, Benner says, serve an important function by repelling each other, so that the DNA won't crumple up like a wadded piece of tissue paper. Without the phosphates, a mutation in one nucleotide might change the pattern of electrical charges, causing the entire gene to collapse, stifling evolution by causing all mutations to be fatal. This doesn't mean that alien DNA must use phosphates for its backbone—but it does mean that a substitute must carry a similar electrical charge.

There's no obvious reason, however, why alien genes must be encoded by long chain molecules. It might be possible, Benner suggests, for genetic material to be packaged into rectangular arrays, like chain link fences instead of chains.

In addition to having genes, alien life will probably need something similar to proteins. But even if these protein equivalents are made of amino acids, there's no reason for them to use the same amino acids we do. (This would be a major problem for interstellar travelers hoping to find food on other worlds. On the other hand, it might also make it unlikely that alien predators would be all that interested in people.)

Another thing that chemical life probably needs is a solvent in which to carry out its chemistry. On Earth, that solvent is water. Earthly life is so strongly associated with this solvent, in fact, that NASA's mantra for astrobiology is "fol-

[16] "Alternative Life Styles for Extraterrestrial Chemists," *Eos. Trans. AGU*, 83(47), Fall Meet. Suppl., Abstract B62A-02, 2002.

[17] Having only a single extra base—five instead of four—would allow each 10-"letter" sequence to be nine times as information-rich as our own. And the increase in information goes up exponentially with the length of the DNA segment. With 12 bases, a 20-base segment would have nearly 3.5 *billion* times more "word" choices than our four-base DNA.

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low the water."

But is water actually necessary for life? Benner thinks not. Organic chemistry doesn't require it—in fact, laboratory chemists carry out many of their experiments in other solvents. Without getting all that esoteric, Benner suggests that life might be able to use sulfuric acid as its solvent, or a high-pressure ammonia/methane mix.

And suddenly we've come full circle to Squzztzzs. When I started this article, I thought he was cute but unlikely. But the more I wrote, the less impossible he looked. His world seems to have the essentials for life: an energy input (the Sun) and a solvent in which it's possible for chemical syntheses to take place (ethane). Biochemically, the biggest problem is with his behavior—it's still hard to figure out how he'd get drunk on hydrogen—and even harder to imagine how, if that gas did intoxicate him, he'd produce flammable flatulence.

But here again, recent astrobiological findings come to the rescue. Squzztzzs' world looks a lot like Saturn's moon Titan. Jonathan Lunine, a researcher at the University of Arizona's Lunar and Planetary Laboratory, recently modeled the effect of cometary impacts on Titan.[18] He found that the heat of impact will melt the water in the comet, and (so long as the comet doesn't splash into in an ocean) that much of the liquid water will collect in the crater, forming a deep enough puddle that it will take a while for all of it to freeze.

Better yet, the water from the comet, Lunine calculates, will react with Titan's surface materials to form an organic-chemical stew. Lunine was interested in the degree to which these impacts could enrich Titan with the precursors to life, but I'm merely searching for something chemically reactive, that's likely to scramble Squzztzzs' biochemistry—preferably something that contains oxygen atoms that he can purge from his system as oxygen gas. Melted comet material should work quite handily. Forget the hydrogen-sniffing. Anyone care to join him in a hot toddy of ammonia water? ■

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[18] "Titan and the Origin of Life," *Eos. Trans. AGU*, 83(47), Fall Meet. Suppl., Abstract B62A-01, 2002.

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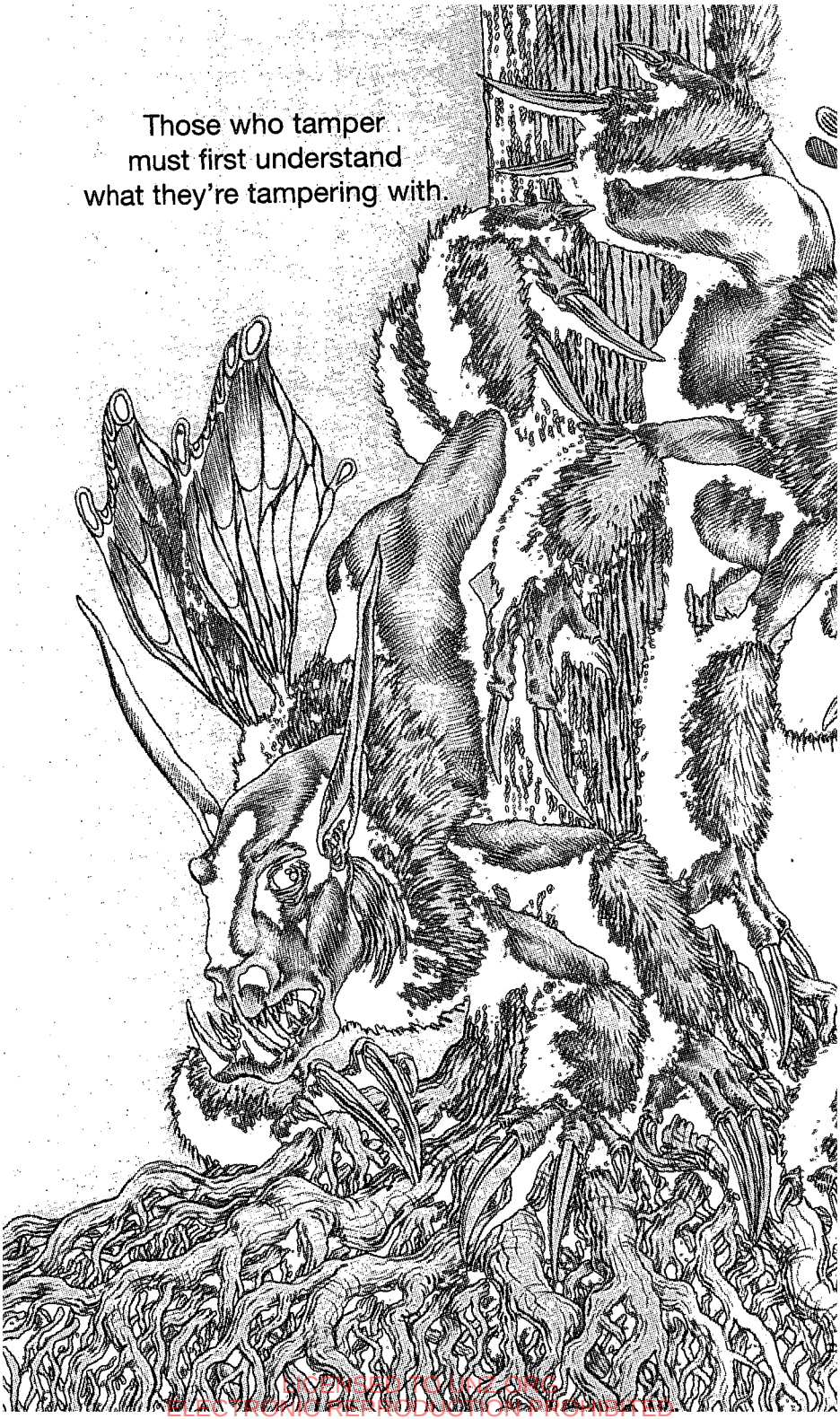

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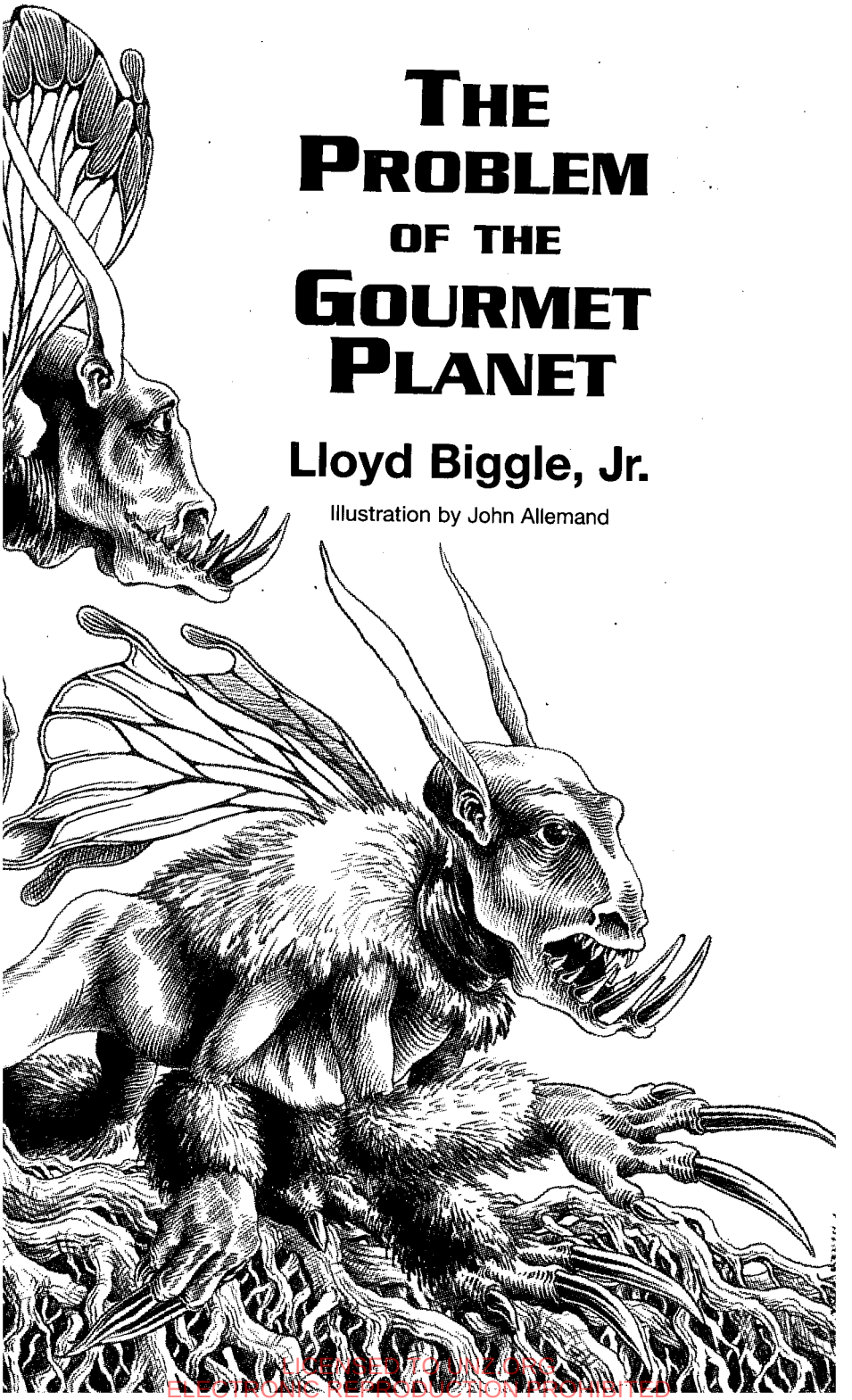
The Problem of the Gourmet Planet

Lloyd Biggle, Jr.

Illustration by John Allemand



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It was a medium-sized, fur-bearing animal with wings. Its fur was scraggly, blotched, hideous-looking; its appendages were massive claws, six of them, in two rows of three along its underside. Its face was ornamented by two large, prehensile, hairless, razor-sharp, serrated ears, and it terminated in a vicious snout from which curved teeth protruded.

Of all of the unattractive lifeforms of the world of Easole, which at times seemed overpopulated with unattractive lifeforms, this winged Parlonzol exceeded the rest by far. The most unimpartial observer would have called it hideous.

There was only one thing to be said in its favor, and that was hardly an advantage to it. Its breast meat was positively, remarkably, unbelievably delicious.

Everything on the world of Easole was delicious. The fruits were lusciously juicy and sweet; the tubers contributed flavor as well as an unbelievable amount of nourishment to any dish they were added to. The meat animals—apart from the Parlonzol—would have added zest and flavor to any cookout feast in the galaxy. Among these many delicacies, Parlonzol meat was unique. IPR agents, veterans of gastronomic feasts as well as culinary disappointments on worlds across the galaxy, had never encountered anything that approached it anywhere else.

Coordinator Sten Markus, who had gained all of twenty kilograms since his assignment to Easole, firmly believed that the entire Universe, when the IPR Bureau got around to extending its explorations beyond the galaxy, would offer nothing that even approximately equaled it.

In the meantime, between feasts—every meal on Easole was a feast—he had the usual humdrum administrative tasks to take care of. He sat scowling at a spacegram he had just received.

"Damn!" he muttered, dropped it onto his desk, and then picked it up and read it again. Fortunately every base headquarters had an official whose duty it was to handle problems like this. He—or, in this case, she—was called the Assistant Coordinator. He pressed a button on his desk.

Lawrie Proslin was middle-aged and verging on elderly. She was hanging around in the hope that someone, sooner or later, would come to their collective senses and appoint her coordinator of some innocuous world while there was still time for her to do useful work. She was a great gal, in everyone's opinion. In her younger days, she had always been too valuable to release from whatever position she held. She was rapidly approaching a deadline beyond which she would be too old. She strolled in, seated herself without being invited—she and the coordinator were firm friends, and he was doing his utmost to get her promoted—and asked, "What idiotic thing does sector headquarters want now?"

"Sector headquarters," Markus announced, clipping the words out bitterly, "has decided to inflict a special inspector on us."

"Indeed. To inspect what?"

"Sector headquarters doesn't say." He passed the spacegram across his desk to her.

"She'll be someone's green-haired girl, I suppose," Proslin said gloomily.

"It isn't a she," Markus said. "At least—Elton Winglor. I don't think that sounds feminine. By the way—someone's green-haired girl. Ever since I was assigned to this sector I've been hearing that, and I've become curious. What does it mean?"

"You've never served a term on the world of Baalon," Proslin said.

"Until now, that fact has never been important. What's the connection between Baalon and green-haired girls?"

"Baalon is feminine-orientated. World of Amazons. Every year it holds a kind of Olympic games, but games emphasizing prowess in intellectual rather than physical attainments. Mathematics, physics,

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chemistry, even architecture, music, whatever. The winners, who usually are females, get to wear their hair green for an entire year as part of their prize. Not a lurid green, but a special, shimmering, luminescent green. Carries enormous distinction on Baalon."

"I imagine it would. Difficult to overlook."

"Anyway, a green-haired girl is someone specially favored for something."

"On that basis, Elton Winger is probably someone's green-haired girl. What he is coming to inspect I have no idea. Let's hope he has the courtesy to tell us. I've had special inspectors who kept their assignments secret, wrote a devastating report, and departed with us not having an inkling of why they were there."

"You want him feasted, I suppose."

"Any meal here will be a feast compared with what he is accustomed to, but—yes, I suppose we should lay on a special meal to celebrate his arrival."

Elton Winglor, green-haired girl or not, certainly wasn't formidable in appearance. He was slight in build, short in stature, and he wore old-fashioned bulging contacts. He had a high-pitched, almost squeaky voice. Markus gave him his best VIP reception and turned him over to Lawrie Proslin, who found suitable quarters for him while Markus went to make certain the promised feast was being prepared.

They ate in the staff dining room, with Markus, the newcomer, and a few high officers at the head table. Winglor almost fell out of his chair at his first taste of Parlonzol.

"What is *that?*"

"Parlonzol," Markus said. "Local animal."

"Parlonzol? Is this the meat you want to export?"

"Export?" Markus echoed doubtfully. "I don't recall . . ."

Suddenly he did recall. Months previously, someone had come to him with the suggestion that frozen breast of Parlonzol would find an enthusiastic reception among connoisseurs of the galaxy's gourmet foods. The IPR Bureau was perennially short of funds, and any local headquarters that found a way to add plusses to its budget was regarded with favor. The restrictions on draining a planet's resources were severe, however, and exports were rarely approved. A primitive world with easily-accessible copper reserves, for example, might be quickly stripped of them by the superior technology the IPR Bureau could apply to them, and when the planet's own primitive population reached a level of technology where it needed copper, the deposits it would normally have been able to make use of would already be exhausted. Therefore only easily renewable resources could be exported.

When someone had come to Markus with the suggestion that they export frozen Parlonzol breasts, Markus had reviewed the regulations carefully, asked for a study of Parlonzol breeding rates—what little was known about them—and decided that a limited annual harvest would not put the population in danger. On this basis, he had approved the application.

Now that project had come full circle with the arrival of a green-haired girl, who would, he supposed, evaluate his conclusions and render a decision. Serving Parlonzol meat at his arrival dinner may or may not have been a wise decision.

From the manner with which Winglor gobbled it, it was wise. He said, finally, wiping his lips, "This certainly should find a market if we are able to make it available. Don't the natives eat it at all?"

Markus described the semiannual Parlonzol hunts by which the stone-age natives killed Parlonzols by the thousand, smoked the meat, and stored it for leaner days.

"Ah—yes," Winglor murmured. "Parlonzols by the thousand—and you think the Bureau could export additional thou-

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sands without affecting the population level?"

"We hadn't thought in terms of thousands," Markus murmured. "A few hundred, perhaps, to test the market . . . "

Winglor took another mouthful of Parlonzol breast. He chewed thoughtfully and swallowed. "That market doesn't need testing," he announced.

Later, in Markus's office, they reviewed Winglor's assignment. "I'll have to get into the field and acquire firsthand knowledge of the creature's breeding habits and reproduction rates. Perhaps you could assign me a team of escorts who can show me everything I'll need to see?"

Markus nodded reassuringly. No one, on any IPR-managed world, was permitted into the field without extensive training and a schedule of rigorous testing. An exception could be made in a case like Winglor's—obviously he had no time for the extensive training an ordinary agent would undergo, so he was assigned a team of trained and experienced agents who would keep him out of trouble.

"I'll look the situation over carefully and give you a decision before I leave," Winglor said. "There is one other matter. The Bureau's principal mission on this planet has been stalled for decades. Is there any recent progress to report?"

Markus looked past Winglor to a framed plaque that ornamented the wall behind him. It read, in large, luminous letters, "DEMOCRACY IMPOSED FROM WITHOUT IS THE SEVEREST FORM OF TYRANNY."

The mission, the raison d'être of every Interplanetary Relations Bureau team, was to raise the technological level of a planet and reduce the political factor to a minimal level ten democracy. Easole would have been rated about 99—no democratic factors at all over one, which meant a minimal technology.

Markus answered carefully. "No, no progress. My predecessor, when he turned the world over to me, opined that there was likely to be no progress during his lifetime. I greatly fear that I will have the same message for my successor. I will instruct your escorts to include a survey of the native life forms with your Parlonzol survey. After that, if you need further information . . ."

"Very good." Winglor got to his feet. "I need to rest and get accustomed to natural gravity after that long space trip. Then I'll be ready to go to work."

The natives of the world of Easole were due for their semiannual Parlonzol hunt, and after a conference with his staff, Markus decided that one of these would be the best possible introduction for Winglor to both the Easole natives and the teeming hordes of Parlonzols that populated the Parlonzol rookeries. Markus decided to come along himself to see how Winglor reacted.

It was still dark when they floated a platform along the unbelievably rugged coast to one of the flats favored by the Parlonzols. Scraggly branf trees dotted the tidal flats, their enormous, thick roots spread widely to give them anchorage in the loose mud of the flats. The Parlonzols scrounged the mud and the tidal pools for the tiny crustaceans and other marine life that inhabited the area. The trees consisted of a tall stalk with no offshoot branches for the first thirty feet of their growth, and the Parlonzols nested in the trees in lairs formed of tidal mud. This they plastered around the trees like doughnuts a good twenty-five feet above the ground, and it formed a secure lair as hard as concrete.

Unfortunately for the Parlonzols, they made poor use of their lairs. It was still dark when Markus and his party brought the platform to rest on a long-established observation post, a towering, steep-sided spur of rock.

"The clods will be taking up their positions now," Markus explained. "Clods" was the IPR Bureau term for the natives, whose official name, Easolians, had somehow never caught on. "The Parlon-

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zols emerge about dawn and begin their search for food. The clods will wait until the entire population is reassured and sufficiently hungry to lose their caution. Watch!"

They made themselves comfortable and watched and listened to the strange croaking and squeaking of an unfamiliar world coming to life in the growing dawn as night noises faded and day noises began to take shape.

Suddenly Parlonzol heads began poking from holes in the plastered lairs. They were nothing if not cautious; they looked out, withdrew, looked out again. Markus did not speak, but he pointed to the shelter of a rock ledge where a group of clods had scurried to cover. That was careless of them, arriving this late. One glimpse might spoil the hunt and make the Parlonzols timid for days to come.

As they gained confidence, the Parlonzols came down the trees in a rushing flood and began exploring the tidal pools. The clods shrewdly waited until the rookeries had emptied and the Parlonzols were spread widely about the tidal flat. Then, with whoops, they left their hiding places in a rush. They were tri-legged and tri-armed, and on those three legs they achieved an incredible speed.

Little more that was complimentary could be said about them. "Ugly creatures, aren't they?" Winglor observed. "Never saw curved snouts like that before."

The Parlonzols began their flight the instant the clods appeared. Those close to the trees went up the tall, bare trunks with an unbelievable speed of their own, their viciously clawed feet giving them secure grasp. On land, however, their speed on those clawed feet and stubby legs was a pathetic waddle.

The clods easily overtook them and began swinging clubs, and the air was filled with a piteous bleating as one Parlonzol after another had its skull crushed or its neck wrung. The Parlonzols weren't entirely defenseless, however. Those vicious, curved teeth could slash with good effect. Both attackers and victims were bloody messes before the first stage of the battle was over—the blood from both being a bubbly, sticky black substance.

When the Parlonzols who had failed to reach the safety of the trees were all dispatched, the clods turned their attention to the remainder. The Parlonzols, instead of seeking the safety of their cement-like lairs, had chosen to climb to invisibility in the trees' upper branches, where the large, flapping leaves concealed them.

At that point, the clods showed their one stroke of originality. They produced slings that were woven of unusually tough plant fibers. With three legs and two arms positioned on the ground like a five-pronged tripod to give them leverage, they used the free arm to launch stones into the trees' upper branches. One unlucky Parlonzol after another toppled out, to be immediately seized and dispatched—but not without the same piteous screams and the slashing that brought more black blood to the scene.

"Those cries sound almost human," Winglor muttered.

"They certainly do," Markus agreed. "If our export project is approved, we'll have to devise a more merciful method of killing them."

Finally the hunt was finished. The remaining Parlonzol had sought safety in the trees' highest branches where only an occasional lucky shot would hit one. The clods gathered their catch, gave themselves rudimentary first aid by plastering mud on their wounds, and began a long trek back to their encampment where the females already had fires going to begin smoking Parlonzol breasts.

Markus told Winglor, "Twice a year they conduct a hunt exactly like this one. We have never noticed any diminution of the Parlonzol population. This is why we thought a carefully restricted

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export of Parlonzol breasts would place no undue strain on the population."

"And—this same thing happens all over Easole?"

"Certainly not—only where the Parlonzols are plentiful. They flourish only in a temperate climate and only where a tidal flat is to their liking. We've identified more than fifty such areas—all along coasts where there are suitable tidal flats."

"I see. You've made a good point. I'll need to verify it, of course, and I'll need to know a lot more about the clods. Strange they could produce those remarkable slings but no other weapons."

"They use rudimentary spears and their clubs when they hunt small ground creatures. Apparently the sling is only effective against Parlonzols."

"I see. And what sort of government do they have?"

Markus grinned. "DEMOCRACY IMPOSED FROM WITHOUT . . ." was written indelibly on the mentality of any Bureau Special Inspector. He said thoughtfully, "The clod who can lift the largest club is chief. They strictly adhere to a might-makes-right form of government. When a chief dies—or someone else becomes strong enough to quite literally overthrow him—there's a free-for-all to choose a new chief. Any suggestion of democracy would be beyond their comprehension."

"I see. I'll have to look into all of this." Was it Markus's imagination that his eyes, behind the bulging contacts, took on an unnatural gleam. "Where are the young Parlonzols?" he asked. "And the old ones? These all seem to be of a similar size and age."

"This is something we haven't figured out ourselves," Markus confessed. "No doubt they have roosting areas where the young are hatched or given birth to, and they've been able to keep them secret from their principal enemies, which would seem to be the clods. But at the stage of development of the flock you just saw, they need a seashore flat for a feeding ground. No one has been able to offer a better explanation."

"I think," Winglor said, "I'll have to find a better one before I can approve your export project."

Markus shrugged. "You'll have your team of assistants. They'll take you anywhere you want to go that is safely within regulations. If that isn't sufficient, apply to me and I'll do what I can for you."

The days that followed became weeks; the green-haired girl proved to be nothing if not thorough. He investigated the world of Easole from pole to pole and, on the rare occasion when Markus encountered him—back to headquarters to have supplies replenished or give his team members a needed break—he had to confess to Markus that he'd made no progress at all in tracking the elusive Parlonzol roosting areas. He had, however, learned a great deal about the Easolians.

"You are right, there," he said. "Unfortunately. They are thoroughly uncivilized brutes, and I can't see them developing genuine democratic governments, either on their own or with assistance, in anyone's lifetime. As for technology—those slings are amazing things, and I don't suppose they could have been developed entirely by instinct. There must be some latent ability there and more knowledge and comprehension than we would have any right to expect. There is no pressure on them to improve, unfortunately."

He shook his head. His eyes had taken on a gleam of feverish determination, and he girded himself for another joust with the recalcitrant planet.

The next thing Markus heard about him was thoroughly alarming. He had disappeared, along with his entire team.

"That's not possible!" Markus exclaimed.

But vanished they were—green-haired girl and six veteran and thoroughly experienced agents given to him as assistants.

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"Didn't they file a plot?" Markus demanded.

The green-haired girl had decided it wasn't necessary.

Markus engaged in some highly original profanity. Anyone venturing out on any kind of exploration had to file a plot detailing exactly where they were going and what they expected to accomplish—in part in order to avoid precisely this situation—having someone disappear when no one knew where they were going or where they had been seen last.

He ordered a quick survey of base personnel to find out whether anyone knew where they had gone or what they had been doing. "Flying along the coast," was the most exact description he could get from anyone.

There were untold kilometers of sea coast on Easole. Even thinking about searching all of them brought on violent headaches, but it would have to be done. Markus set up a search and rescue team, laid out charts, plotted overlapping routes.

And waited for results. There were none.

On the eighth day, when Markus was reluctantly pondering what explanation he would give sector headquarters for the disappearance of its green-haired girl, base was electrified by the report of something to report. A patrol following the northwest coast on the central continent had glimpsed something in a narrow, lateral valley that should not have been there. It was, unmistakably, an observation platform, identical to the one Winglor's group had flown. There were no instruments in use, however, and there was no sign of Winglor or his agents.

"What did the pilot who spotted it do?" Markus demanded.

"He returned to base for instructions," Markus was informed.

"You mean—he just flew off and left it?"

"He was afraid he might get into the same kind of trouble that trapped Winglor and his group. He wanted to make certain someone knew where the downed platform was."

"Sure, he did," Markus said scornfully. "Actually, he got a severe case of cold feet. What if Winglor had been in urgent need of help right at that moment?"

He dispatched a fleet of platforms with the pilot who had seen the vanished platform serving as guide. But though he was positive about the location, no downed platform could be seen when they returned.

Markus was beside himself. Winglor may have been a green-haired girl, but Markus was about to become a bald-headed coordinator, the loss of hair being due to the total frustration he was experiencing.

Then, without any warning or explanation, Winglor suddenly returned to base, announced that his team was badly in need of rest, and promised a full report as soon as he was sufficiently rested himself to write one. As it happened, Markus was away from base flying on yet another search vector when Winglor returned. When Markus got back, he could learn nothing except that the prodigals were safe and sound and had left orders that they weren't to be disturbed.

"If I'm never sent another green-haired girl, that will be too soon," Markus exploded.

But eventually the missing crew surfaced, called for food, and, while they were eating, informed Markus that showing him what they had found might be better than handing him yet another report to read.

"I definitely like to be shown," Markus agreed.

"Come along, then," Winglor said. "Bring your assistant coordinator and half a dozen sector chiefs."

"Weapons?"

"None. We aren't going to fight, but to a conference."

"Who on this misbegotten world are

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we going to confer with?" Markus demanded, but Winglor had nothing further to say.

They took off into the dusk—Winglor seemed to think the time extremely important—and flew toward the coast, where they veered north—headed, Markus observed, toward the point where Winglor's downed platform had been spotted. As they reached that tiny, angling valley, Winglor flashed a light. There was an answering flash on the ground. Winglor flashed twice more; the ground answered.

"Going down, now," Winglor informed the others.

They settled into darkness, with Markus and his headquarters personnel looking about them uneasily.

"Follow me," Winglor said. "There's nothing to worry about."

They had to follow the sound of his footsteps crunching on a gravel surface; they could see nothing. When he spoke again, the words were indistinguishable, as though he were using a foreign language. Suddenly a drapery was pulled aside, and the light was dazzling.

They were in a crystalline cavern—but an immense cavern with a ceiling that formed a pointed arch far above them. Winglor turned for a moment as though making certain all of them were there. Then he turned again, led them around a corner . . .

Markus gasped. The enormous room was filled with Parlonzols, orderly rows of them, sitting or squatting, it was difficult to say which. At the end of the room, on a low platform, was the reception committee—a group of superbly dignified elders. Winglor led them before the platform, performed a kind of bow—after a moment's hesitation, they emulated him—and announced, "I have the honor to present the Fermler of all Parlonzols on this planet. He would be considered a kind of Prime Minister on other worlds."

Markus was too dazzled to speak. Lawrie Proslin managed a feeble giggle. No one else said anything. Markus began to take in details of the scene spread around him—the robes the Parlonzol were attired in, the superb discipline of those making up the large audience.

"His Excellency has a request of you," Winglor continued. He bowed again. His Excellency inclined his head slightly. "To come directly to the point," the old Parlonzol announced in a deep, echoing voice—he spoke flawless Galactic—"we would like to have you stop eating us."

They sat on the edge of precipitous cliffs listening to the waves pounding below. All around them the Parlonzols were clustered. The Fermler and his court had taken positions nearby—to make certain, Markus thought ruefully, that these awkward aliens wouldn't fall off. At intervals, a group of younger Parlonzols would launch themselves into the void, cleave the water expertly—there was hardly any splash—and then emerge with an enormous, fish-like creature clasped in its beak.

"Wait until you taste it!" Winglor said into Markus's ear.

"I'm willing to wait," Markus said sourly. Raw meats were a great delicacy on many worlds, but they held little charm for him—especially when coupled with his role of a guest, where he couldn't politely turn them down.

"Do they eat nothing but raw foods?" he asked.

"You saw—no fire. Their lights are luminescent stone formations."

"And—you're certain these characters have a democratic government?"

"Practically a model of its kind. The elderly are the rulers, of course. That's true on many worlds. The young must acquire wisdom and experience before they can be entrusted with leadership roles."

"How'd they learn Galactic so easily?"

"I'm telling you—these characters are brilliant. I was teaching them Galactic while they were teaching us Parlonzolian, and they left us at the starting gate.

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We finally gave up and mutually agreed that communication should be in Galactic. Our conception of galaxies and universes fascinate them. Astronomy was a non-existent science for them until now. The lights in the sky were luminescent stones, they thought, and let it go at that—though they did wonder what happened to them in the daytime. Educating these people is going to be a rare pleasure. They learn so much more quickly than we do."

A flutter of flapping wings from a group nearby applauded some especially skillful catch. The creature was so large that its captor could hardly make it back to the top of the cliffs. An unusually powerful wave crashed against the cliffs at that moment, drenching them. The Parlonzol uttered a cackling sound that Markus had already learned was laughter.

They fluttered to their feet and gathered around Markus and his party, still concerned that they might fall off.

"Ready to eat?" Winglor asked.

"I suppose," Markus muttered, "I'd better be."

The Parlonzols made a picnic of it. They had produced lights, their luminescent stones, and Markus watched incredulously while chefs expertly dispatched and dismembered the six-limbed monsters the Parlonzols had brought up from the sea. The portions were served on thin but sturdy platters of a slate-like material. They ate with legs dangling over the precipitous cliffs. The raw meat was delicious. So were the assorted strands of seaweed that accompanied it.

"I can't believe it," Markus said. "It never occurred to any of us that these sea creatures and the seaweeds might be food—and delicious foods, at that. But what are we going to do about the clods? It pains me to think of all the brain power that has been wasted trying to find ways to impose democracy on them."

"It couldn't be done," Winglor said. "The Parlonzols' problem is that they have no technology at all, no tools of war, no tools, period. So they can't defend themselves. They'd be pathetically grateful if we could show them a way to defend their young."

"That will be simple, I think," Markus said. "Just for a start, we could put an electrified fence around the rookeries. It would have to be a sturdy fence, and eventually the clods will find a way to knock it down or climb over it, but it will do until we find something better."

"Will sector headquarters approve it?"

"I think so, since it would be entirely for defensive purposes. The fence won't go around biting the clods, and their mentality level is so low that it'll be a long time before they figure it out. In the meantime—will the Parlonzols want cities and electric power and all the rest, including farms and husbandry and agriculture, or will they be content with their caves by the sea and their diets of raw fish or whatever those creatures are?"

"Any change will have to be gradual," Winglor said. "My instinct tells me it'll be a long time before the Fermler will be entertaining his guests with deep-fried anything." He grinned at Markus. The green-haired girl had more than justified his status. He said, "What are you thinking about?"

"I'm thinking," Markus said ruefully, wringing out the sleeve of his cloak, "that the brilliant export business in frozen Parlonzol breasts I had counted on to get me promoted just got drenched in sea spray." ■

[Editor's Note: This story continues the saga of the Interplanetary Relations Bureau, which has been the subject of two novels (The Still, Small Voice of Trumpets; The World Menders) *as well as shorter works* ("The King Who Wasn't"; "The Pristine Planet"; *etc).]*

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JUST BUSINESS

Ron Collins

Some things never change, but some do. . . .

Here's the facts.

In 2025, Alphonse "The Glob" Calidino took over the nastiest crime syndicate in New York City. In August 2026, Frankie Morena, a boyhood pal of mine and a guy I call "The Man," ordered a hit. Three days later the Glob became one with a loading dock on Manhattan Island after lying down on the wrong side of an asphalt spreader. Go there today, and you still see the oily stain.

My pal Frankie took over within twenty-four hours.

Two weeks later he called me to his office. I showed up promptly. If I know one thing, it's that promptitude is always good when you're dealing with the Man, don't matter that you're good buddies or not. Frankie was an early riser, so the sun was still under the ocean when I made it to his high-rise. He stood beside his mahogany table, in a pressed gray suit and a crisp blue tie. Panel windows gave a darkened view of the city, which I suppose is okay if you like the city, but gives me the willies seeing as I'm afraid of heights and all. A leather-bound planner and a single sheet of paper sat on his desk next to a half-eaten muffin.

Vin and Krueger were sitting in opposite corners of the room, both hidden in shadows. Vin's pupils blazed with an infrared tint, and Krueger flexed a hand so slowly that I could almost hear the microhydraulics inside.

"Hiya, Frankie," I said. "What's with the goon squad?"

Frankie jumped like he hadn't seen neither, then gave a nervous wave of his hands. Vin and Krueger left the room. I can't say as I missed 'em.

"Mick," he started once the door was shut. His $600 Ferragamos left imprints in the shag carpet as he paced. "I've got a problem."

"Then I'm here to help."

He ran his hand through slicked hair. There was something wrong about

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Frankie today. The lines on his face were deeper than normal and brown rings clung to his eyes like an old widow to her inheritance. His hands shook as he wrung them together.

"We've been friends for how long, Mick?"

"Since grade school, Boss."

He nodded. "We go back a long way."

"You know you can count on me," I replied, feeling an unpleasant sensation below my breastbone. "We're blood brothers, right?"

"Yeah, Mick. Blood brothers." Frankie looked at me. His hands shook as he retrieved a Partagas cigar from his breast pocket.

"You okay, Boss?"

"I need you to do a hit."

"Whatever you say," I said. "Who's the stooge?"

"The Glob."

I chuckled. "He done been hit."

"Then you'll hit him again."

"Should be an easy job," I said with a smile.

"Don't bet on it."

Frankie lit the cigar and the room filled with the smell of the Dominican Republic's finest. A bluish cloud of smoke surrounded him as he sat down and pulled his chair close to the desktop. I sat down with him, and he leaned forward so that the tip of the cigar was only a few inches from my face.

"He's back," Frankie whispered.

"The Glob?"

He nodded, looking both ways like he was afraid someone might be behind him. "He's here. I never know when he's coming or when he's going, but things will be really quiet, then boom! Suddenly he's here."

"I don't believe in ghosts, Boss."

"Neither do I."

"But you just told me—"

"I just told you the truth."

He clenched his teeth so hard his cigar broke in two. I only had to be hit over the head a couple times to see Frankie was serious.

"You need a hit, I do you a hit."

He sat back with a sigh of relief, and put the cigar into an ashtray he pulled from one of his desk drawers. "I knew I could count on you, Mick," Frankie said. He poked his finger at me. "You stay right here with me and watch for the Glob."

"Sure, Boss. Want I should take a spot over there in the corner?"

He shook his head violently. "Stay right here. Right here beside me." He drew a calming breath. "Just in case."

Sweet Mother Mary, I thought. Frankie's done gone over the edge. But I sat there all quiet-like because I figure it don't never do a guy no good to tell the Man he's running light on motor oil. The phone rang. I tried to pretend I wasn't hearing nothing.

"What?" Frankie said too forcefully as he answered. "No. No. I'm not going nowhere today, Annie. No. Sorry, babe. No." He hung up the phone.

The sun came up and the water reflected all red and orange. The day turned to afternoon. We ordered meatball sandwiches in. Frankie finally dozed into a dream that made him twitch like the little cocker spaniel I had when I was a kid. My mama, Lord rest her soul, used to say Peppy was chasing rabbits. I watched Frankie chase rabbits all afternoon. Gave me the friggin' chills.

He woke with a start.

"Jesus, Boss. You're white as a sheet."

"Did he come?"

"No. Ain't been nobody here."

Daytime faded to evening. The chair was wearing sores in my backside regions, and the skyline twinkled with lights against the black sky. Then it happened. Sure as I was sitting there beside Frankie—the Glob stepped out of a dark corner. Frankie gave a yip. I grabbed my gun out of its pocket, and proceeded to put four bullets right through the Glob's heart. These were .45 caliber shells with hollow points capable of stopping a charging bull at fifty paces.

The Glob didn't fall, though.

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He stood there, all shimmery and gray and transparent as a three-dollar bill. I never believed in ghosts before, but I got to tell you the idea was growing on me.

The Glob looked in my direction. "Now whadja go and do that for, Mick?"

I glanced over at Frankie, who shrank deeper into his chair.

The Glob shrugged. "I see. Just doing your job, eh?"

He walked in a half glide, half waddle until he stood right in front of Frankie's desk. "Hello, Frankie. Sorry to be away for so long. You'd think that things would be all harps and angels feeding you grapes in the great beyond, but even here it seems like there's always something ya gotta do."

Frankie just stammered and sank even lower.

"So, what's it gonna be, Frankie?" The Glob peered into Frankie's face.

"I, uh, well . . ."

The Glob gave a hollow sigh. "I may be immortal, Frankie, but I only got half the patience I used to. I told you once, I told you a thousand times—turn your territory over to my boy Pauley, or I do you and your family a few extra nighttime visits." He put his vaporous hands up to his neck. I swear I felt a graveyard chill run up my back. "Those visits won't be near as nice as these."

Frankie gave a choking sound.

The Glob faded back into the shadows and was gone.

Frankie ran a handkerchief over his brow, and panted like a dog. "You got to help me, Mick," he said. "We're buddies, right? You're the only guy I can trust now."

"Sure, Boss," I said.

"We gotta get rid of the Glob once and for all, or we're dead."

"I see that," I replied, though I wondered about the *we* part, seeing as I hadn't noticed the Glob threatening me.

"What you gonna do?" Frankie asked.

I thought a minute. "Don't know. I suppose the first thing is to figure out how you get rid of ghosts."

"Good idea," Frankie said, standing up and pacing.

Not certain of exactly what to do about such a thing as a ghost, I went to see Sister Lisa Michelle.

"Sister, I need your help."

"What's wrong?"

"I got a ghost I need to exorcise."

"Have you tried McNally's gym? They're just down the street. Sister Gloria's been going the past six weeks and you should see her abs. I hear they've got a deal right now, too."

"Not that kind of exercise," I said. "I mean I got to do the old deep-six, if you get my drift."

"Yes." The sister grimaced. "I get your drift. Can't a guy take a joke?"

"So, can you set me up?"

"We don't do that anymore."

"What?"

"Vatican directive of 2022. We don't believe in ghosts—"

"But I seen it with my own eyes."

"—and, as I was trying to say, even if we did believe in ghosts, which we don't, then they would be people, too, and we wouldn't participate in such abusive treatment."

"But . . ." I stared at her, certain that my eyes were bulging out of their sockets.

"You might try the Baptists," the sister said. Then she leaned in and whispered. "Or you could go to one of those shops downtown."

"Voodoo?" I said with unsettling visions of tiny heads sitting on broad shoulders.

"It was just a thought. Or, you could do it yourself."

"I could?"

"Don't see why not. Just because we don't sanction it, doesn't mean a parishioner can't try."

"I see." I rubbed my chin. "How would I go about doing that?"

"I don't really know. But I'm sure there are a billion books that might tell

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you."

I gave a halfhearted nod. Books and I don't get along too good, but in a race between Cordellia the voodoo priestess and a piece of paper, you don't have to guess too many times to know where I'll head. "Okay," I said. "I'll find a book."

"Tell me again," the librarian said. "What exactly are you looking for?" She was getting up in age, and wore her hair pinned back like a pair of Victorian curtains. Tired lipstick ran up into the little wrinkles around her pursed lips.

"I told you, I want to learn how to kill a ghost."

"Isn't that a bit redundant?"

"You calling me stupid?"

"I said redundant, not ignorant."

"Lady," I said, pausing to stare for all of three seconds. "All I need to know is how to kill a goddamned ghost, all right?"

"You don't have to be so frosty about it."

"You been goin' on for fifteen minutes about the do-he-or-don't-he decimal system, and playing twenty questions about the computer this-an-that, and I ain't yet to see a goddamned word about ghosts. I think I'm due a little frost."

"Well, all right. Follow me." She grabbed me by the elbow and sashayed toward the back of the library. The bottom of her blue skirt swayed this way and that as she walked. Holy Mother, I thought, this old dame likes me. It took a full minute to shake off the creeps from that idea. I mean, yeah, I'm a single guy and getting a little long in the tooth myself, and my belt size is edging up closer to my age every day, but . . . I shivered and followed her along past a rack of data cubes and digital disks. I never knew a library could be so damned big. We went past wide-screen crystal panels that were all being used by kids playing the latest *Zeta Blaster* game. And we went past rows and rows of computer terminals and data discs. In the far corner, a guy was using a holoprojector to look at the way muscles laid over a body. Call me sentimental, but the sight of a skinned stiff standing in the library was enough to make do a double-take.

Finally we made it to the back of the library where they still had books.

"You've got your medieval mythology," she said, sweeping her arms this way and that. "And your religious scripture, and then over there is all the old New Age material."

The wall of books was like a freaking tidal wave.

I pried one out of the row, afraid that the entire rack might crumble. It was old, with a black cover and pink lettering. *Ghosts and Goblins: Halloween Treats from the Old World.*

"Have I told you how much I hate books?" I said.

"That one explains the origin of Halloween mythology," the librarian replied.

"Doesn't sound very interesting."

"You might be surprised."

I put the book back.

"Here," she said, pulling a title. "How about this one?"

Exorcism: A How-To Manual.

"Hey, that sounds good."

"Can I get you anything else?" She batted her eyes and waited there, all expectation and excitement.

"No. I'll just go over there and read a little."

"Oh," she said. "All right. If you change your mind, you know where to find me." She stepped past in short, quick steps and turned at the end of the aisle. Then she was gone.

I went to a desk in the corner and started to read. Fascinating book, really. Who would know there were so many types of ghosts and demons? I skipped the chapters on possessions and poltergeists, and went straight to hauntings. A half hour later, I knew what I needed to know. I was worried I might forget it all, so I figured to take the book with me.

"Excuse me." The voice came as I reached the door. It was the librarian.

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"Yes?"

"Are you planning on checking that out?"

I looked at the book. "Oh, yeah, sorry." I put the book on the tall table between us. She picked it up.

"Can I see your card?"

"My card?"

"You need a library card to check this book out. I can get you one now if you need it."

"Great."

She stared me straight in the eyes and clutched the book close to her chest. "Dinner, Friday night. Pick me up at seven."

"Excuse me?"

"I said you can pick me up at seven."

Damn. She had me. So I made the deal. What the hell, eh? Who knew what was going to happen in the future. I might not even be drawing oxygen come Friday. She wrote her address on an index card and slipped it between the pages of the book.

So I bought frankincense and myrrh and a few candles. I scarfed a set of blessed crosses from Dooley's Pawn Shop, and paid a little extra for a nice incense holder. A few hours later I found myself down on the dock where the Glob got splattered—just before midnight, hanging the crosses and smelling the pot of incense burning away. The smoke mixed with the salty ocean and the odor of seaweed and sewage rotting under the pier to make a combo that's pretty far out of this world.

Once that was done, I looked around to see if anyone was watching. Not seeing no one, I started the process with a little prayer.

"Holy Father," I said, waving the incense about like it was a flare. "Look down upon this ground with your fav—"

"What the hell are you doing, Mick?"

I jumped with a start and rolled to the ground, coming up with my gun pointed straight at the man's heart.

"Didn't we already try that?"

"Alphonse," I said. He was standing all silvery by an old crate. I looked at the Glob's oily stain, then glanced at the book I had set on the dock. "You wasn't supposed to show up until I got past the prayers."

"Can't believe everything you read, Mick. Don't you know that the pope frowns on knocking off ghosts these days?"

"I heard that," I said. "But he also says something about knocking off regular guys, and I think we both done that."

"That's just good business, Mick. The Big Guy understands business. Knocking off ghosts, though . . . That's something altogether different."

"Guess I don't see it."

"It's all about the soul, you see? A regular guy is a helluva lot more than a soul. You squinch a geezer who done wrong, you get rid of his body. His soul just goes on to the next place. A ghost, though—someone like me—well, I ain't nothing *but* a soul, so you go about squinching me and you ruin my eternity."

I laughed. "So you're saying that knocking off a regular guy is kinda like a service."

"Depending on the situation," the Glob said, his smile bending at his translucent lips. "Truth is, though, the best thing you can do for a ghost is to let him free, too."

"I don't get it."

"What's that book say about why ghosts get stuck here in the neverworld?" The Glob looked at me with one of those parental, *I'll wait forever* kind of expressions. I figured he meant it literally.

"Unfinished business?" I said.

"That's right. Unfinished business."

I didn't like where this was going. "I'm not so good at guessing games, so how about you just say what you're thinking so we can stay out of the night air too long."

"It's Frankie," the Glob said.

"I figured you might say that."

"I always said you was a pretty smart

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guy."

"So, you're suggesting I hit my own boss?"

"Makes sense, don't it?"

"Not in no book I ever read."

"Think about your future, Mick." The Glob glided over and put his weightless arm over my shoulder. Hair prickled on my neck, and I started to stammer. "You want to be right with the Big Guy, don't you?"

"Sure," I said, moving out from under his arm. The whole conversation was like riding one of those spinning cups at Coney Island—it made me feel like I had to puke, but it was too late to get off now.

"You hit Frankie, and my soul will be free. The Big Guy would like that. He would see it like doing him a favor. I mean, Frankie's not a really good guy, you know?"

I stared at him slack-jawed.

"Look at me, Mick. I'm a freaking ghost. You think I don't know what I'm talking about?"

That's when I saw it. At first I thought I was missing something, but there it was—a little flicker off to the Glob's right. Something was wrong here.

"What's the matter?" the Glob said.

I stared at him, feeling my eyes widen. "Nothing," I said. "It's just that this whole thing gives me the creeps—you being a ghost and all."

"Just think of it as doing your job, you know?"

I dodged the question while I gathered my wits. "Squinching a boss has never been a good way for a man to do his job," I said.

"Get serious, Mick. Frankie told you to make me go away, right?"

"Just business, right?" I said. I tried to look nervous—which wasn't hard seeing as I was worried that I couldn't figure out what I had seen and I had a dead mob boss trying to get me to work for him.

"Oh, I understand. Believe me. But you're a smart guy. If you squinch Frankie, I'm free. And Frankie's free to move on to the next life, too—probably feeling a whole lot better since I won't be hanging around his neck all day. Think about it that way, and you see that hitting Frankie is just doing us all a big favor."

"You got a point there."

Waves lapped up against the pier, and moonlight reflected off the oily sheen that stained the dock. I looked through the Glob and thought really hard. Maybe my eyes was tricking me, but I thought I saw another flicker behind the Glob, and that got me to thinking even harder. I got a shiver right in my freaking spine when it hit me. Maybe the Glob ain't been hit after all.

The more I thought, the easier it all seemed.

The Glob just stood there, waiting like he had a few centuries to kill.

"All right," I said. "I'll do it that way."

If nothing else, I'm a man of my word.

The first thing I did was to pick the librarian up at seven the next evening. Her name was Jude. We had a good time at dinner, talked forever, and capped it off with popcorn and a flick. By the end of the evening I was singing that old Beatles tune, and she was giggling like she was fifteen again.

When I explained the situation, she volunteered to look up the stuff I needed without me even asking.

I like that in a woman.

Then I went to Frankie's and took care of business. News hit the street right away. Frankie Morena was no more. It was clean and easy. Professional all the way. Just business, you know? I went home feeling pretty good about myself.

The phone rang right on time that next afternoon.

"Mick, is that you?"

It was Two Sticks Casey, a friend in Frankie's family. I worked with him a couple times, mostly shaking down bar-

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tenders for their security donations. He's a good guy on the job, but skittish as a rabbit the rest of the time.

"Yeah, Sticks," I said. "What's the matter?"

"It's the Glob."

"What about him?"

"He's done taken over Frankie's place."

"You don't freaking say."

"I seen him with my own eyes, Mick. He stepped right outta the limo and went up to Frankie's office. We're screwed, man."

Sticks kept on yakking.

"Thanks, Sticks," I said. "Gotta run."

I love it when I turn out to be right.

I'll admit I was worried the Glob might want me squinched, but seeing as no one knew where the Glob kept hisself, I had to do something to get closer. I tailed him all day.

He stopped at Expressimo's Rotisserie for a plate of veal parmesan and spaghetti, pausing every few minutes to greet another shocked waiter or bartender and smiling as he explained the rules of business now that Frankie was gone. The same show played out at Gino's bar and at the Southside Laundromat.

Turns out I didn't have to worry none about how to get together with the Glob. I was down at Morelli's Ribs taking in a plate of my favorite baby backs when Goosey Jones slid into the seat across from me. Goosey got his nickname for getting slapped upside the head by a woman he pinched. I looked at the scar that ran down his cheek. Funny as hell at the time.

"Alphonse wants to speak with you," he said.

"Can't you see I'm eating?"

"He don't like to wait, you know what I mean?"

I looked at the ribs. They was only *half* gone. "Think he can wait as long as it takes the both of us to finish these off?"

Goosey smiled and grabbed a rib. "What he don't know won't kill him, eh, Mick?"

I didn't say nothing. Ten minutes later I paid the tab, and Goosey took me down to the Glob's headquarters. He took my gun while we were in the elevator. "Orders, you know?"

"I understand," I said, thinking about the knife in my ankle sheath.

"Mick!" the Glob said as I stepped into the room.

Alphonse Calidino's office was the opposite of Frankie's. First of all, it was in the basement. It was also old and cluttered—old as in antique, cluttered as in three guys were there with more hardware hanging off their belts than Batman. I recognized them all—Three Face Kennedy, Johnny Colletta, and Simply Maurice, all The Glob's favorite goons. The place smelled like cheddar cheese and cold cuts, which wasn't surprising seeing as there was a plate spread out on the table to one side of the room. The far corner was filled with a contraption that looked like a cross between a forklift and an electric chair.

I looked at the Glob. No doubt he was real and in the flesh. "I thought you was dead," I said to keep appearances up.

The Glob laughed so hard his gut jiggled. "I been running into people all day who made the same mistake, Mick."

"Whose guts are splattered over the dock?"

He leaned out over the desk, almost spilling the Styrofoam cup he had been drinking from. "First rule of business, Mick: Don't ask questions when you don't want to know the answer."

I decided to drop it. "You're moving on Frankie's territory," I said.

"Don't look like he's using it."

"Maybe he'll come back, too."

"I don't think so." The Glob stood up and waddled toward the metallic platform in the corner. Both his shoes and the floorboards squealed with distress.

"Do you know what this is?" he said.

"Looks like a shower stall."

"Doctor Frenelli?" the Glob said a little

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louder than he needed to.

A nerdy little guy who looked like he was made of toothpicks emerged from the dark corner beside the contraption.

"Tell my buddy Mick what's up with this."

"It's a holographic projector," Nerdboy said, pointing to the contraption with his thin finger. "But it's a better one than you've ever seen before. It creates patterns of photons where you are, then maps them to photons anywhere within range of the receiver. Even better, we can program it to sense wave patterns, too."

"Sa-weet," I said. "So what exactly does that mean?"

The Glob laughed. "It means I can send images anywhere I want, or have full conversations through it, or even take a gander at anything that strikes my fancy. Hell, I already found Sonny McLellan skimming his pony card, and T-Wreck cutting dope deeper than he ought to know better. Operational two weeks, and it's already saved me three hundred grand."

I looked at the machine. "Jesus Mother Mary," I whispered. "Where did you ever dream that up?"

"Cornell, actually," the little guy said.

"So you tricked me into squinching Frankie by pretending to be a ghost," I said to the Glob.

The Glob shrugged. "Just business, right?"

"Right," I said. "Why'dja bring me here? Why not just plug me and be done with it?"

"Gotta be honest with you, Mick. I considered that." He put a meaty hand on my shoulder. "Then I thought, you know that Mick, he's a pretty smart guy, he knows what side his bread is buttered on and he's damned good with a gun. I figured maybe you could be useful to a guy like me."

"You want I should work for you?"

"Thought I would give you the option, anyhow." He smiled so big I could see his capped teeth.

I looked at the three goons and Nerdboy, then back at the Glob. I looked at the projector. "I don't know that's a very good idea, seeing as I work for Frankie and all."

"Frankie's eating six feet of dirt," Simply Maurice said.

"Well . . . maybe not," I replied.

Footsteps rumbled from the stairs.

I felt the Glob's fingers close around my shoulder. "What are you telling me, Mick?"

Kennedy and Colletta made for their utilities. Simply Maurice simply dived behind a table. Nerdboy stood there shaking. The door burst open, and the guys poured in. The blaze of Vin's crimson eyes flared, and an energy beam took Kennedy in the shoulder. The Glob wrapped a big arm around me so tight my collarbone hurt—but when Krueger got him by the neck and closed that mechanical hand, the Glob seemed to think better and let go of me.

A second later everything was quiet.

Frankie stepped in, draped in a dark trench coat and fedora, smoking a Partagas like something out of a hundred-year-old movie.

"Good evening," he said.

"What the hell?" the Glob squeaked in a hoarse voice.

"What's the matter, Alphonse? Did you think you was the only guy that could play dead?"

The Glob stammered.

"This is all mine, now, Alphonse."

"Bullshi—"

Three more people stepped in. The three amigos—Jack "the Ripper" Francis from the financial district, Perilous Pauline Tedero from upper Manhattan, and Guido "Mozart" Tchaikovsky from someplace deep in Spanish Harlem. None of these folks were big enough to run the city, but a guy needed to control all three if he intended to make a real buck here.

Frankie smiled. "I've got more, Globby. The whole city's on my side of this one."

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Pauline's red hair caught the light from under the hat she had slanted at a hard angle. "We seen it all, Alphonse."

"We can't work under those conditions," the Ripper said.

"Da machine's got to go," Guido added.

Frankie nodded to Vin, who put his crimson eyes to work at turning the projector into a slagheap.

Nerdboy gave a stifled cry, but was too scared to move.

The Glob struggled to speak, and Krueger let up on the pressure. "I don't understand. How did you know?"

Frankie gave me a look that said it was my story to tell. That's something I like about the Man.

"I saw your projector flicker when we was on the docks. So I got a friend to check up on it. She tracked it to Nerdboy's school, and Frankie took it from there."

The boss blew a stream of blue smoke and looked at the melting holomachine, then at Nerdboy. "Did you know it takes only a few million dollars to rent one of those from your buddies in Cornell?"

"You've got a projector?" the Glob said.

"That's right. And we been listening in," Pauline said.

"We don't like what we hear," Guido said. "Frankie runs his business on trust—so that's who we're backing."

"I own this city now," the Glob growled. "I'll put you all out of business."

A siren blared in the distance.

"I don't think so," I said smugly. "That recording of you talking about watching your guys run games and dope was piped straight to the Feds' computer system, complete with a location tag." That last part was Jude's idea, and I found myself enjoying the thought of her quite a bit right about then. A woman who knows as much as she does is a damned fine thing, especially if she's a hoot to be around when she lets her hair down.

The Glob got red in the face and struggled to run, but Krueger put the pressure back on and Globby stopped in his tracks. The other guys got the Glob and his gang all tied down.

"You were right about Mick, though," Frankie said as he put his hat back on. "He's a pretty smart guy. We woulda never found you if he hadn't have had the idea to use hisself as bait." Then he and the three amigos ducked out.

I was the last one to leave.

"You were right about something else, too," I said to the Glob as I stood in the doorway. "I know what side my bread's buttered on."

Frankie, he understands.

He offered a long vacation at first, but I told him I figured I was done with the squinching game. It's like the Glob said back on the dock—you got to figure the Big Guy understands business, but all these goings-ons with ghosts and souls and everything done got me to thinking about who I was and all that, and I decided I couldn't handle it all no more. Not a big deal, I suppose. I was getting too old for it anyhow.

I asked Jude out again for Saturday. And Sunday church. And Monday. By Tuesday evening, we was headed out to a ranch she inherited from her father. It's in Wyoming somewhere, and she says it's got sky so big you can see to Mars on a clear day. Sounds like a nice place where a guy can make sure he's all right with the Big Guy, if you know what I mean. I've got a little cash stashed back, and we can both do piece work if things get tight. We should be all right.

Maybe life *is* just business, and maybe business really *is* just who you know. I'll always love Frankie like a freaking brother, but I decided I'm taking care of my ownself now. So I got Jude sitting in the car beside me and I'm riding 230 horses toward a clean future.

Feels pretty damned good.

And that's a fact. ■

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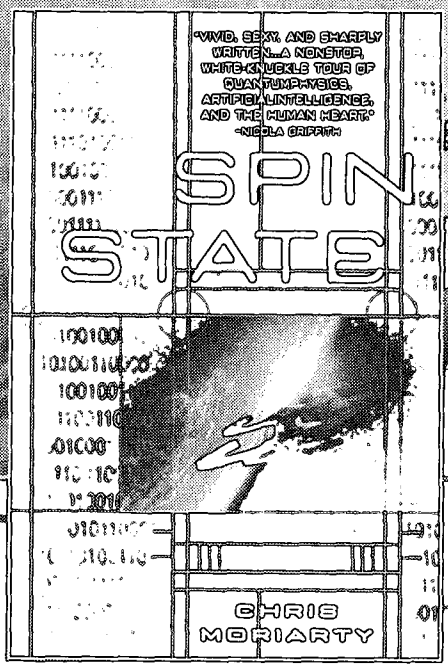
SHE'S HACKED HER MEMORY
TO PASS AS HUMAN.
BUT NO UPGRADE CAN
PREPARE HER FOR THE FUTURE.


"VIVID, SEXY, AND SHARPLY WRITTEN...A NONSTOP, WHITE-KNUCKLE TOUR OF QUANTUM PHYSICS, ARTIFICIAL INTELLIGENCE, AND THE HUMAN HEART."
-NICOLA GRIFFITH
SPIN STATE
CHRIS MORIARTY

UN Peacekeeper Major Catherine Li is hiding secrets about her past. And in a post-human universe of emergent AIs, genetic constructs, and illegal wetware, one misstep in her hunt for a killer could literally blow her mind.

"A THRILLING, HIGH-END UPGRADE OF CYBERPUNK!"
—Kay Kenyon, author of *The Braided World*

"VIVID, SEXY, AND SHARPLY WRITTEN."
—Nicola Griffith, author of *Stay*

"SCIENCE FICTION FOR GROWNUPS WHO WANT SOME 'WOW' WITH THEIR 'WHAT-IF.'"
—David Brin, author of *Kil'n People*

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Born Under the Sign of BONANZA

Robert Scherrer

Survival value and truth are not quite the same. . . .

Your life will have more spark
If your teeth glow in the dark

My last ad campaign for Everbright Toothpaste had been a glorious success, but it had also driven me to quit Olsen & Olsen in disgust. Which was why I was now cruising the deep suburbs in my aging BMW, looking for the Center for Memetics Research. It took me half an hour to find it—a red-brick pancake of a building that might have once been a 1960s primary school, with those silly bubble skylights that seemed futuristic forty years ago. But there was no identification on the building, not even a street number.

Three hours and six non-disclosure agreements later, I sat facing my new supervisor, Josh Raines. "Okay," I said, "*now* can you tell me what it is that you do here?"

"We conduct research in memetics, of course," said Josh. He smiled. "I guess that doesn't really answer your question. Follow me." He led me through a maze of dim linoleum corridors, stopping in front of a closed door, where a blue-gray glow spilled out the bottom. "This is our analysis center."

Josh pushed into the room. A bank of TVs, each one tuned to a different station, flickered on three of the walls, while a mound of books covered the fourth. A gangly scarecrow of a man—all elbows and knees—sat at a desk in the middle of the room, scanning a computer monitor and occasionally glancing up at the TVs. His gnarled hands danced on a keyboard.

"Stan," Josh said to the scarecrow, "I want you to meet our newest hire, Paul Glavin. He'll be—"

"Nice to meetcha," said Stan. He jumped out of his chair and hopped around the room on bowed legs, staring briefly at each TV, his nose only inches from the screen. "Hee, hee, the logosphere is really cracklin' today. We got five hits on the late-night talk shows last night, and a few Internet splashes this morning."

"Stan is one of our trackers," said Josh.

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"I think we even picked up a hit on Martha Stewart," said Stan. "Man, that show's hard to penetrate. It was the one Genesis launched last week—about using Crisco as bathroom caulk. Never did get anywhere with those bumper stickers you guys released—'What Would Martha Do?' Haven't scanned the daily papers yet. Just need a few more cups of coffee." He was like Jed Clampett on Benzedrine.

"Stan'll be retiring next year," said Josh.

"You guys can't put me out to pasture," grumbled Stan, rubbing his white mustache. "I got more experience than anyone else here. I was watchin' for hits on Jack Paar on a little black and white TV before you were born. You need me. I was here when we launched pet rocks. Gotta get me some coffee." Stan bounced out of the room, and Josh motioned for me to sit in his chair.

"This is where we monitor the logosphere," said Josh.

"The what?"

"The logosphere—the realm where ideas propagate—newspapers, books, TV, the Internet, even bumper stickers and bathroom graffiti. Back in the '50s and '60s, the U.S. government did a series of secret studies in chemical and biological warfare. They would dump clouds of inert chemicals or harmless bacteria on cities and trace how they spread. We do the same thing with ideas. We develop new ideas, dump them into the logosphere, and see how they spread and evolve."

"But why all the secrecy?" I asked.

"Do you give the lab rats a blueprint of the maze?" Josh thrust a sheaf of papers into my hands. "You'll join the Genesis team—the people who create the ideas."

"But my background is in advertising, not philosophy. How do you expect me to come up with good ideas?"

"Oh, we don't generate good ideas—that would corrupt the experiment. The whole thesis of memetics is that ideas prosper on the basis of their ability to spread. It has nothing to do with whether they're true or false. To keep the experiment clean, we generate only *bad* ideas." Josh pulled a fat book from the pile and tossed it to me. "Here, do you recognize this?"

I read the title on the dust jacket: *Management Secrets of the Three Stooges: Are you a Moe, a Larry, or a Curly?* "Of course I recognize it. It was required reading when I was at Stanford Business School. I think it even made the Times bestseller list."

"Well, we wrote it here," said Josh. "One of our greatest successes. And remember all of that alien abduction stuff?"

"You did that?"

Josh beamed. "That was ours." He began ticking off ideas on his fingers. "Along with half of the fad diets you've ever heard of. And the idea that power lines cause leukemia. And the claim that Elvis is dead—"

"But he is dead."

Josh arched his bushy eyebrows. "You've got a lot to learn."

My first few weeks at the Center were a study in frustration. Every Friday morning I'd give Josh a new list of ideas, which he would present to some sort of executive committee, and then on Monday afternoon he'd come back with the bad news: my ideas were unoriginal, or they contained some grain of truth that would "corrupt the experiment," or they simply weren't bad enough. "Just keep at it," he would say. "You'll get the hang of it."

After a couple of months, I got my big break. Josh was reading down the list I had submitted, giving me the usual critique. "'Cheez Whiz prevents colon cancer.' The committee liked that one, but we tried something similar last year with Twinkies. 'The government is snooping on us by selling listening devices disguised as cantaloupes.' There's actually an element of truth to that one, which

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I'm not free to divulge. 'The Coffee Diet. Just drink three cups of coffee before every meal and watch the pounds melt away.' You've been talking to Stan too much. But this last one is intriguing. 'Teleastrology.' How is that supposed to work?"

"Well, astrology is based on the idea that your destiny is determined by the position of the planets and stars at the time of your birth. Teleastrology assumes that your fate is based on the television shows that were being broadcast at the instant of your birth."

Josh tapped his chin with his pen. "It's certainly a bad idea. I think we'll give it a trial run. Draw up a detailed description and we'll send it over to the Release group."

Teleastrology proved more successful than I had dreamed possible. Within weeks I was writing a teleastrology column syndicated in dozens of newspapers. Stan wrote a computer program to automate everything, and in three months we had a magazine, a website, and several home teleastrology kits. But when I saw the letters coming in to the magazine, I began having second thoughts.

"DEAR TV SEER,

TELEASTROLOGY HAS CHANGED MY LIFE. I WAS AN ACCOUNTANT IN MANHATTAN, AND COMPLETELY MISERABLE. ACCORDING TO MY TELEHOROSCOPE, I WAS BORN UNDER THE SIGN OF *BONANZA*, SO I HAVE A NATURAL AFFINITY FOR WIDE-OPEN SPACES AND LARGE MEN NAMED 'HOSS.' I MOVED TO MONTANA, AND I LOVE IT HERE.

TERI LEHRER"

Josh was unimpressed with my doubts. "Sure," he said, "ideas change lives. What's the problem?"

"But people are taking this stuff seriously. I don't think it's right to delude them."

"Don't get all holier-than-thou on us. I've looked at your file, the stuff you worked on at Olsen & Olsen. Do you remember a breakfast cereal called Xylem, with 'the wholesome goodness of cellulose'? I gather they were making it out of sawdust?"

"Well, it is a form of fiber—"

"And what about Clear 'n' Bright Shampoo, 'the only shampoo with no artificial chemicals or additives'?"

"That was completely true," I said.

"Sure—the shampoo consisted entirely of distilled water. And then there was that line of educational children's toys: Baby's First Sewing Machine, Baby's First Bunsen Burner, Baby's First Chainsaw—"

"Okay, okay, but I quit the advertising business to get away from that kind of stuff."

"And you did get away from it. The work you're doing here is part of the progress of science. And if that isn't good enough for you, you're under a one-year contract. Now get back to work."

I trudged back to my office and slumped in my chair. In my absence, another mound of letters addressed to *Teleastrology Monthly* had piled up on my desk. I opened a few of them: "At last I understand why I've failed at everything I ever tried—I was born under the sign of *Gilligan's Island*", "I have decided to marry a wacky redhead named Lucy. Where do I find her?" "Can you help me? I am doing a Ph.D. dissertation on the teleastrological effect of cable TV, specifically, the Golf Channel". I jumped up and marched down the corridor to Stan's office.

I found Stan slumped over his desk, asleep, the cotton wisps of his hair brushing against a desk plaque that read, "I'll give up FORTRAN when they pry it out of my cold, dead hands."

"Stan, wake up!"

Stan lifted his head and looked at me with one eye open. "Well, it's the teleastrologer himself. Damn, it's almost 3:30. No wonder I fell asleep. Always need two cups of coffee after lunch."

"Stan, you've got to help me. We can't keep misleading people."

"Hey, once the genie's out of the bot-

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tle, you can't put it back in. Which reminds me—you ever watch *I Dream of Jeannie*? Great show—you can catch the reruns on cable. Didja know that they never showed—"

"Just do me a favor, Stan. If I can convince Josh that this stuff is true, it'll void the whole experiment—they'll have to end it."

Stan rubbed his threadbare head. "I'm the best tracker they got. Why should I go messin' things up?"

"You are the best, Stan, and they're going to kick you out the door just for being too old. Just like those TV guys cancelled, uh, Red Skeleton."

"Skelton, his name was Red Skelton. Yeah, he was the funniest guy on TV. And they booted Lawrence Welk for bein' too old, too."

"It just isn't fair, Stan. Don't let them get away with it. Help me do this, and it'll teach them a lesson."

Stan tugged his mustache. "Well, I guess it would serve 'em right. What do you want me to do?"

"Can you write a program to pull up telehoroscopes and personal histories for all of the Center employees? Then I'll line everyone up with the most accurate telehoroscope. It'll convince Josh that teleastrology really works—he'll have to pull the plug. Will you do it?"

"Probably take me few days. Better get some more coffee."

Stan sent me the telehoroscopes and personal histories—they were already correlated, saving me the work. And when Josh came to my office to look at the results, he didn't seem particularly flustered.

"It happens maybe once or twice a decade," said Josh, shrugging his shoulders. "The craziest ideas turn out to be true. My predecessor was shocked when they discovered that cigarettes really do cause cancer. Boy, that was a mess." Josh pulled a memo pad from his pocket. "We'll cancel teleastrology—kill the newspaper columns, scrub the website, maybe release some antagonist memes. It'll die out in a year."

"It'll die out? You're sure? Even though you think it's true?"

Josh shook his head. "You're so hung up on this truth thing, Paul. Ideas don't spread just because they're true. Haven't you learned anything while you've been working here?" Josh turned to leave, but glanced back over his shoulder. "Next time, try to come up with something *really* bad."

I finished out the year at the Center and went back to Olsen & Olsen—I guess there are some jobs worse than advertising.

Things would have ended there, if I hadn't been grocery shopping on a drizzly Saturday afternoon. As I wheeled my cart of frozen dinners through the check-out line, I caught a glimpse of *Teleastrology Monthly*. Splashed across the cover was Stan's grinning face, below the headline, "Newest TV Seer Predicts Your Future."

I skimmed the article in the parking lot, while raindrops smeared the print across the pages. I raced home in a rage and phoned Stan. "I saw the article. How could you do it?"

"It's not what you think," said Stan.

"Look, I know the Center forced you out, and you probably needed the money. But how could you lie to so many people?"

"I'm not lyin' to anyone. You saw the telehoroscopes I sent you."

"Yeah, so what? You're not making any sense."

"Didja ever look at your own telehoroscope? I pulled it up with all the rest. That's what really convinced me." He hung up.

I pulled up the program Stan had written to generate the telehoroscopes and typed in my own date and time of birth. The response was almost instantaneous: "Paul Glavin: born under the sign of *To Tell the Truth*." ■

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THE ALTERNATE VIEW Jeffery D. Kooistra

ISAAC WAS WRONG (MAYBE)

Bombs are bursting in air over Baghdad as I write this, so I'm a bit preoccupied. Don't worry—this isn't going to be a column about the war. At the current rate of progress, the war will be old news long before this column sees print.

Catching up on my *Analog* reading has served as a distraction from the news. It has also given me a chance to provide an actual "alternate view" to something that has appeared in these pages.

I am referring to the fact article by Ben Bova in the April, 2003 issue, "Isaac Was Right: N Equals One," and Stan's April editorial, "Still Guessing After All these Years," which was prompted by Bova's piece.

Now, I do not disagree with very much of what either of them had to say. Like Ben Bova, I too have found the invoking of the Drake equation to prove that lots of intelligent alien species must be out there to be little more than, as he put it, numerology.

You know what the Drake equation is, right? That's the one where you start with the estimated number of stars in the Universe, multiply that by the fraction of those stars that might have planets, times the number of planet-bearing stars that might have planets that can support life as we know it, and so on until you finally arrive at that fraction of intelligent species which could conceivably communicate with us. (I've always thought they should add a factor for that percentage of species culturally insane enough to broadcast their existence into the great unknown, but they haven't.) We can probably get within a factor of ten of the number of stars in the observable Universe, but all of the other factors in the Drake equation require educated guesses. People enamored of the idea of using radio telescopes to search the skies for signals from aliens (the SETI folk) use the equation, with suitably optimistic educated guesses filling in the blanks, to show that such a search is not simply a fool's errand. Indeed, we are often told that even with relatively pessimistic assumptions (relative to what, I don't know) the Milky Way alone might be home to scores, hundreds, even thousands of alien species capable of communicating with us.

But you are never more than two educated guesses away from complete ignorance.

Bova's piece, if you missed it, argued that the number of intelligent species in the Universe may, in fact, be one . . . us. I agree that there is no *a priori* reason known to science (yet) that says that intelligence must eventually evolve. After all, billions of species on our own Earth have never come within a country mile of an IQ of even 1, yet most of them have been around far longer than have we.

Bova also made a point of explaining why his opinion about the frequency of advanced civilizations differed from the opinion offered in an earlier *Analog* fact article, one by Dr. Robert Zubrin, "Galactic Society," in the April, 2002 is-

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sue. So Stan, ever the even-handed editor, having published both pieces, decided that he'd write an editorial explaining what the current *Analog* position is on the matter. Of course, he said that *Analog* doesn't have a position on it. He, like I, sees so many unknowns that need to become knowns before we can ever hope to use the Drake equation, that he holds to the view that 1) we don't know, and 2) nobody else knows, either.

So what's my alternate view if I agree with so much that both Ben Bova and Stan Schmidt say? Well, use of the Drake equation to prove that there are other civilizations out there with whom we could communicate is predicated upon the idea that we have, as yet, seen no evidence for them here on Earth. Both Ben and Stan seem to take this as a given, and I'm not sure that's fair. I think that maybe we have seen that evidence but that, by and large, the Authorities that Matter cannot or will not accept it as valid.

So, yeah, UFOs.

For many, perhaps even some of you, UFOs are seen only by freaks and weirdoes, or ordinary, largely ignorant folk who think they're seeing a flying saucer when really they're seeing Venus (because, you see, those country bumpkin sorts don't get out at night much, and when they do, they don't look at the sky). Never mind that some of those ordinary, ignorant folks are astronauts, and airline pilots, and engineers, and amateur astronomers, and meteorologists, and science fiction writers, and so on. Their simple claim that they've seen something in the sky that is genuinely unknown is tantamount to proving that they have some screws loose, and likely missing.

Granted, some people who think they've seen a flying saucer are, in fact, bumpkins. But to be honest, I haven't met any genuine bumpkins that I know of. Even the least educated of people I've met are too skeptical to call some odd-looking thing in the sky a UFO, for poorly educated does not mean unsophisticated. True, some people with some other kind of problem may be prone to jump to the UFO explanation first, like chronic attention seekers, but you can't fault the UFOs for that.

It seems unfair to me that the SETI folk are taken (reasonably) seriously when the UFO folk are not, because both use essentially identical arguments.

What I mean is that the UFO culture uses its own form of the Drake equation, even if not explicitly. That is, they multiply the number of reported sightings by the fraction of sightings made by credible observers, times the number of those sightings that resist conventional explanation, and so on until they arrive at a total number of sightings that seem explicable only by extraterrestrial visitation. And, just like with the Drake equation, the assumptions made to arrive at a number for most of those factors can be wildly far off the mark.

However, if anything, the factors in the "UFO-Drake equation" can be known with far more certainty than those in the original. It is simply a matter of data collection to find out how many reported UFO sightings there are. And of those, it is not at all optimistic to assert that we can certainly get to within a factor of two of the number of total sightings that are easily attributed to mundane circumstances.

In the ordinary Drake equation, the later factors like those for how frequently life appears, and for how frequently intelligent life appears, are nothing more than guesses. We can do much better than that in the UFO-Drake equation. For instance, the UFO-Drake equation might have a term for something like "that fraction of credible UFO reporters who have genuinely distinguished a *bona fide* mechanical flying contraption from something else." A pathological skeptic might say this factor equals zero because people who report UFOs are, by definition, unable "to genuinely dis-

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tinguish *bona fide* . . . etc." But we know, for a fact, that this number *cannot* be zero.

In recent years, the CIA has admitted that some reported UFO sightings were actually sightings of secret aircraft of which the public had been kept in the dark. So some ordinary people *can* correctly identify a UFO as such. It may not be of alien manufacture, but it is a genuine UFO. If one wishes to do the legwork (someone may have already), correlating the flight histories of those secret craft with UFO sightings attributable to those flights will yield a UFO-Drake equation factor that is demonstrably more reliable than *any* of the factors in the ordinary Drake equation.

As an aside, the National Institute for Discovery Science (NIDS) has performed a study which correlated sightings of triangular-shaped UFOs with proximity to various military airbases around the country and the flight corridors between them. Several strong correlations were found, which is to be expected if some fraction of UFO sightings are attributable to secret government programs (regardless of whether or not they're flying home-grown stuff or Trektech reverse-engineered from crashed flying saucers). For more, see the website at http://www.nidsci.org.

At this point, some of you are no doubt screaming at the magazine, "Dammit, Kooistra! Everyone *knows* the government can't keep a secret. They couldn't possibly keep the lid on alien visitations. People would talk. We'd *know!*"

To which I reply, "What secret?" Oh, sure, there is no official acknowledgment of aliens visiting us. But people, some of them government insiders, *have* been spilling the beans about government UFO secrets for years. We just don't believe them.

But let's look at Roswell, the most famous purported UFO crash and cover-up story, to see what it says about how well the government can keep secrets.

As the story goes, a "flying disc" was reported by a military spokesman to have crashed near Roswell, New Mexico in 1947. Headlines appeared; photographs were shown of debris. The next day the military denied that the crash involved a flying saucer, but rather said: "It was a weather balloon, now shut up and go away."

For years the UFO community has claimed that the first story was the correct one. Decades later, the military admitted that there had indeed been a cover-up. They said what had actually crashed was a balloon from something called Project Mogul, at the time a top-secret approach to detecting Soviet nuclear tests.

If this second explanation is true, then the military certainly was able to keep a secret. Indeed, they kept it so well that one of the scientists who actually worked on the project in the 1940s, one Charles B. Moore, didn't even know it was called "Project Mogul" until he was told almost fifty years later. (See http://www.csicop.org/si/9507/roswell.html.) And one of the ways they kept it secret was by failing to convince people that it wasn't really a flying saucer.

Sneaky little bastards, weren't they?

On the other hand, if it really *was* a crashed alien spaceship . . . but I'm sure you can see where I'm going.

A skeptic might still assert that there is no reason why the government would keep alien visitation secret. But surely there is.

Instead of an alien spacecraft, let's consider what would happen if a B2 stealth bomber flew through a time warp and crashed outside Roswell in 1947, dropping in the military's lap a human weapon about fifty years beyond the state of their technological art.

If someone reports that a flying disc crashed, I can guarantee you that a higher up is going to change that report to a cover story and quick. The US being only two years past World War II, the military is going to be pretty anal about

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information concerning an unknown aircraft that managed to make its way undetected to within just miles of our single "nuclear" air base. Over time, stories would leak out that the craft was invisible to radar. That such a thing is possible is not something you'd want your enemies to know about.

So how would the military react if an alien spaceship with technology centuries ahead of ours crashed? Perhaps tell us it was a weather balloon?

Of course, none of the above tells us whether or not N = 1. But I do think I've made the case that the UFO-Drake equation should be taken at least as seriously as the SETI version.

And maybe someday Stan will tell us what the official *Analog* position is on UFOs.■

Human thought is like a monstrous pendulum; it keeps swinging from one extreme to the other.

—Eugene Field

It takes a clever man to turn cynic and a wise man to be clever enough not to.

—Friedrich Nietzsche

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The Rescue

Kevin Levites

First Contact happened when the alien ship had crashed a year before, and no effort was spared in treating the survivors. The best biochemists, biologists, surgeons, acupuncturists, herbalists—even veterinarians—had been gathered into a think-tank, and given access to the most sophisticated imaging equipment that humans had yet devised.

A few of the aliens died, and their bodies were minutely dissected to provide information to help the survivors. The remains of those unfortunates were packaged in ornate, hermetically sealed caskets, awaiting repatriation to the rescue crew.

One by one, the survivors seemed to recover—whether by natural process or by clumsy, uninformed medicine done on the fly—and they devised a rudimentary, interspecies language.

Everyone knew that the United Nations used the Arecibo radio telescope to transmit their distress call, and a crude dialog—replete with good-natured misunderstandings—was established.

One thing was for certain, though . . . knowledge and learning was the medium of exchange between space-faring species.

A few days had passed, and odd lights appeared in the sky as the moment approached.

The ship descended, and there were collective whispers of anticipation as the doors irised open and the rescue crew disembarked.

The castaways were led into the ship, and the captain remained behind to address the secretary general of the United Nations.

"Thank you for helping my people," he said, in a sing-song voice that emanated from a translator box.

"You're welcome. Our pleasure."

"We must go now, but you have our thanks."

This was unexpected, and there were confused murmurs from the crowd.

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"Wait . . . can't you stay for at least a little while? Maybe give us a little of that fancy science that brings you between the stars? After all, our best doctors saved the lives of your castaways. Does your kind have no gratitude?"

The captain stood motionless, and another crew member handed him a small cartridge, which he plugged into the translator box.

"Sorry, there is a misunderstanding. Everyone uses scientific knowledge as the medium of exchange between species."

"We know that," said the secretary general. "We would be happy to accept any scientific knowledge that you care to offer."

A different crew member came out of the ship and handed another module to the captain, which he promptly plugged into the translator box.

"We have further debriefed our crew members, and I now know better how to explain. They told me to say that you would understand about something called an HMO, and that we can't authorize treatment from providers that are out of the network.

"You are welcome to file an appeal with the home office through your radio telescope. I suggest that you follow the format carefully, as any mistakes may delay your claim . . . especially because of the speed of light limit over which we, of course, have no control.

"As a courtesy, my assistant will provide the declination and right ascension in your units before we leave." ■

IN TIMES TO COME

It's always a special (and unfortunately rare) treat to have a new story by P. J. Plauger, and we have a big and powerful one to lead off our December issue: the novella "Lucky Luke." It's not often that a story can show a whole new kind of relationship between human beings, but this one does it. I can't tell you much more now except to say that you might also view it as seasonally appropriate—whether you're Christian, Druid, or anything else!

We'll also have stories by Kyle Kirkland, Charles L. Harness, and Bruce Holland Rogers, plus the conclusion of Edward M. Lerner's *Moonstruck*. Catherine H. Shaffer's fact article may be your introduction to a new science: dendrochronology. Trees, to one degree or another, live a long time; they store records of conditions at various times during their lives; and the lives of different individuals overlap. So, collectively, they provide a surprisingly useful tool for archeologists and paleo-just-about-anything.

Finally, we have a special feature by Geoffrey A. Landis. It was hard to decide how else to classify it, but you can count on Landis's thoughts to provoke more in his readers—especially with a title like "The Reason We're Here."

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Shoo Fly

Kathy Oltion

There are two things people like to do
with a new phenomenon; understand it and use it.
Sometimes it's not wise
to be too particular about the order. . . .

Barb Schoen stood at her kitchen counter and cursed the house flies buzzing around her head. It was always this way come August: long, hot, miserable days filled with the buzzing of black, sticky flies and only the hope of a cool shower to revive her. It made her wonder why she'd ever claimed that summer was her favorite season.

She must have had temporary amnesia at the time. In addition to the fly invasion, her nosey Aunt Lydia always insisted on visiting for two solid weeks during the doggiest of days. The old woman complained continually, especially about Barb's cooking. The way Aunt Lydia fussed and picked at her food drove Barb crazy. It didn't matter what she prepared, it never met with her aunt's approval. Going out wasn't the answer either. Aunt Lydia had a million ways to embarrass Barb in a restaurant. Barb still couldn't face the staff at her favorite Mexican place, even years later.

That was bad enough, but Aunt Lydia demanded constant personal entertainment from Barb and Barb's husband Denny, and found the most imaginative of excuses to snoop through the medicine cabinet. Worse yet, she was due to show up for *this* year's visit in two days.

In a fit of pique, Barb waved the serrated kitchen knife in the air in front of her, slashing out at the hovering horde of flies. "Aaahhh!" she yelled primally, taking another swing, but the thought that she might actually hit a fly disgusted her so badly that she quit.

Blowing an auburn curl away from her left eye, she returned to the job of dicing the tomatoes she'd just picked from her garden. It felt good to whack away on the red fruit, to just let go and chop like crazy and use her bottled-up, frustrated energy.

"Jeez, Barb," Denny said, startling her. The slam of the screen door belatedly announced his arrival from the garden.

Barb looked up at her husband and said, "What?"

He glanced at the red pulp on the chopping board and back at her.

They'd been married long enough to have developed their own non-verbal communication. She knew exactly what

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he meant—that he'd caught her in the middle of a rage and didn't approve. She didn't care.

"We've got to do something about these flies or I'll go crazy," she said as she rinsed her hands.

He set a basket of plump green peppers on the counter beside her. "Like what?"

"Do we have any bug spray?" For a brief moment, the buzzing dimmed. She dried her hands then bent down to look under the sink.

"We can't spray the house while we're fixing dinner."

"I can't fix dinner while they're dive-bombing me either!"

Denny gave her another of his looks, the one that said, "Oh, come on now." She gave him a look in return: "I'm not kidding."

"I can get the vacuum and suck them up," he said.

"Eww!"

"Okay, tell you what. Let's just eat outside and I'll set up the tiki torches and citronella candles." He headed outside.

"Yeah, whatever," she said to the slamming screen door. "But I've got to do something," she muttered. How can he not be bothered, she thought. She flicked her hand over the bowl that held the tomato pieces, making sure no flies had landed on them, then covered the bowl with plastic wrap and put it in the refrigerator.

The fly-swatter hung from a magnetic hook on the side of the fridge. Barb gripped it with grim determination and slammed the business end down on the counter, barely missing the hairy little beast by the sink. She raised it in preparation for another blow, but her target had disappeared. For that matter, so had all the other flies.

She looked around the kitchen and waved the swatter for good measure, but it looked like the flies had flown for cover. "That's better," she said aloud as she washed the peppers to add to the salsa.

* * *

The heat of the day finally broke as Denny took the tuna off the grill. A cool, light breeze wafted the sweet scent of honeysuckle across the picnic table. At last, Barb allowed herself to relax as the gently moving air kept the flying intruders away.

Once dinner was over and the Sun had slipped below the horizon, Barb and Denny set about cleaning up and settling in for a quiet Sunday evening. She stacked the dirty dishes and carried them inside, but she nearly dropped everything when she walked into the kitchen. A swarm of flies, even larger than the one this afternoon, greeted her.

"Denny! Did you leave a door open?" she asked when he joined her.

"Can't blame me," he said. "I was very careful to latch the screen every time I went through it." He set the dirty utensils in the sink and went back for the last of the glassware. As he stepped outside, Barb watched two more flies sneak in.

"Damn!" She flung her arms madly around, as if she were hacking her way through dense jungle vines. The allure of raw fish juice and vegetable scraps must be what attracted them. She scraped the plates clean and decided to take the trash out immediately to see if that wouldn't help.

For a moment, while she concentrated on getting the food scraps into the trash, it seemed that all the flies congregated around her, buzzing furiously. The illusion disintegrated the moment Denny returned and the flies were everywhere again.

"Here, let me," Denny said, taking the trash can from her.

"Thanks." Barb rinsed the plates off for good measure and piled them into the dishwasher while Denny carried the trash outside. At least half of the swarm followed Denny. That left only *dozens* of flies behind. Barb reached for the swatter again and got off one good swing before the rest disappeared.

Where the hell did they go? She

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looked around, squinting to see flies against the dark cabinets of the kitchen. Wait, there's one! She swung the swatter, but her intended victim flew right past her. She didn't see where it went. Another glance around satisfied her that the coast was clear.

Barb slipped the swatter back to its hook and wiped down the counters. Her hands shook with exasperation. Maybe she'd have another glass of wine.

Shortly after the 11 o'clock news, Barb and Denny closed up the house for the night and she convinced him to let her go ahead and spray the kitchen.

"Seems kind of silly to spray now. I mean, there's nothing moving anyway."

"Maybe so, but I know they're here somewhere. That many flies don't just spontaneously leave."

"As long as it'll make you happy . . ."

Barb fogged the kitchen with the spray, then gave the baseboard a shot for good measure and put the can away. She hurried out of the room. "Phew. I feel like I need another shower."

"Make it quick. I've got to get up early in the morning."

Barb skinned out of her clothes. They smelled like sweat, charcoal smoke, fish and bug spray. Yuck! She'd just run these down to the laundry room now rather than leave them in the hamper in their bedroom. This way she wouldn't wake up in the middle of the night with that stink in the air. Naked, she tiptoed in the dark to the basement and flung her clothes toward the washer. She'd worry about being neat in the morning.

As she made her way past the kitchen, the insecticide fumes invaded her nose, but it was the buzz that made her stop and turn the light on. Three or four big black flies buzzed in a holding pattern in the middle of the room. These were the kind of flies that looked like escapees of a genetics experiment gone wrong; the kind that thrived on chemicals and just kept growing bigger. Exasperated, Barb stomped into the kitchen and snatched up the swatter. She was determined to get herself a trophy. But like magic, the moment her hand touched the handle, the flies were gone.

"Barb, are you coming to bed or what?" Denny's tired voice called out from the bedroom. He never could fall asleep until she came to bed, too.

"Be right there," she said. She could feel her heart rate pick up and her breathing quicken, which wasn't good, considering what it was she was breathing. She dropped the swatter, slapped the lights off and hurried to the shower.

She wasn't sure how long she'd been standing in the warm water, but it was long enough for her toes to feel wrinkled. There was a knock at the door.

"Yeah?" she asked over the rush of water.

Denny slipped inside and said, "You want a back wash?"

"Sure."

He slid the shower curtain open just enough to reach inside with one arm. She handed him the soap and turned her back toward him to lather.

"Denny?"

"Yeah?"

She hesitated. How could she ask what was on her mind without sounding crazy? "Promise not to laugh, but it seemed that every time I grabbed the fly swatter tonight, the flies vanished."

"Well, then use the swatter." He handed back the soap and rubbed her shoulders.

She leaned into his massage. "That's not quite what I meant. I didn't have to even use the swatter. All I had to do was just reach for it. It was like they knew what I was going to do before I did it and they made themselves scarce somehow."

Denny didn't say anything to that. He finished his scrubbing and reached into the stream of water to rinse his hand off.

"Denny. . . ?"

He dried his hand on the towel before he looked up at her face and said, "You're saying they're psychic?"

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"Telepathic, maybe?" she asked back.

"I think you need to get some rest. You worked hard this weekend getting ready for your Aunt Lydia's visit." He turned and left.

She was tired all right, but she didn't think she'd get much sleep.

By the time she got up the next morning, Denny had already left for the office. It was later than she usually slept, but it had been near sunrise when she finally drifted off. Her dreams had been frustrating, as though she were searching for an answer to her problems and they danced just out of her reach.

Just like the flies and her fly-swatter, she thought. As she entered the kitchen, she braced herself for the maddening buzz, but a solitary fly hovered over the sink where Denny had left a used coffee filter to finish dripping.

Maybe the spraying helped after all, she thought. The perfumy stink still hung in the air, so she opened the windows a crack. With a sense of relief, Barb took her first shower of the day.

Once she was clean, she remembered her dirty clothes from last night lying in a heap on the laundry room floor, so she gathered up the rest of the laundry and took it downstairs, too. That was when she discovered where all the flies had gone. They hovered over her clothes like a black cloud. She slammed the door to the laundry room to keep them from escaping to the rest of the house.

She looked around for another swatter, or a newspaper to roll up, but except for the appliances and the clothing, the room was otherwise empty. She noticed that as she was actively looking for a weapon, the flies seemed to decrease in numbers, but the moment she gave up, they returned in force.

What if she thought so hard as to believe that she held a swatter? Would the flies go away? Or were they smart enough to know she was bluffing? Well, she had a captive audience.

She concentrated on the feeling of a fly-swatter handle in her hand; how the rubber-coated loop of wire felt snug in her palm, how her fingers grasped it. She imagined the heft and springiness of the tool, the snap of the thin, webbed plastic slapper when it hit a countertop. She could hear the whish of air as she wielded it against her enemies. She could read the words Plasti-Swat on one side of the molded red plastic and Made in Metropolis, IL on the other. The fly-swatter was real.

Slowly, she opened her senses and brought her attention to the room around her. Her arm was poised to bring down mass destruction upon the invading hordes, but she was alone in the room. She checked the door leading back upstairs, but it was still closed tight. She didn't know where they went or how they did it and she didn't care as long as they stayed away from her. She went ahead and loaded up the washing machine, keeping track of where she laid her "swatter."

Eventually, curiosity overcame her. She took the stairs two at a time and checked the kitchen. No buzzing. She toured the rest of the house. All quiet. She could hardly believe it. One final question nagged at her brain, so she returned to the laundry room and closed the door.

Amid the humming and sloshing of the washing machine, Barb dropped the idea that she held the fly-swatter and instead, imagined a days-old garbage can full of rotting food. The stench of decomposing banana peels and tomato cores about made her gag.

That did it. All around her, the flies were as thick as, well, flies. There was no garbage within fifty feet of the laundry room, and yet the flies were there. If they weren't clued into her thoughts, she didn't know how else to explain it.

Once again, Barb held her trusty swatter in her hand, ready to cleanse her world of the black menace, and poof—they were gone. The washing machine ended its cycle and Barb tossed the

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clean clothes into the drier, then headed to the kitchen for a cup of coffee, and to think about this new-found power.

She sat at the kitchen table, staring out at her backyard through the window. Her smile grew as she realized that she needn't be bothered by August flies ever again. Summer just got a whole lot more pleasant.

Now, what to do about dear old Aunt Lydia . . . ■

With thanks to Ray Wiebke.

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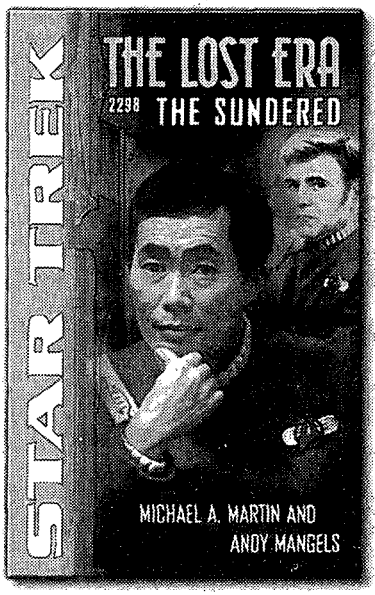
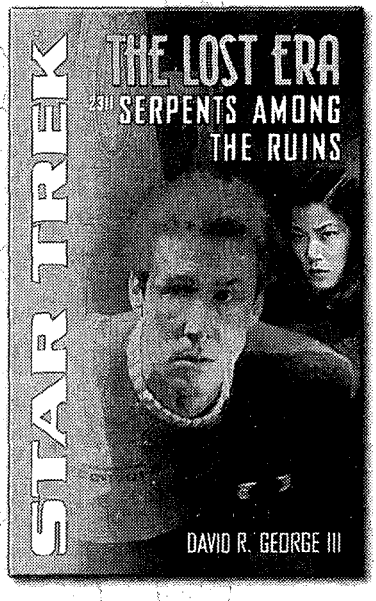
AFTER KIRK...BEFORE PICARD...





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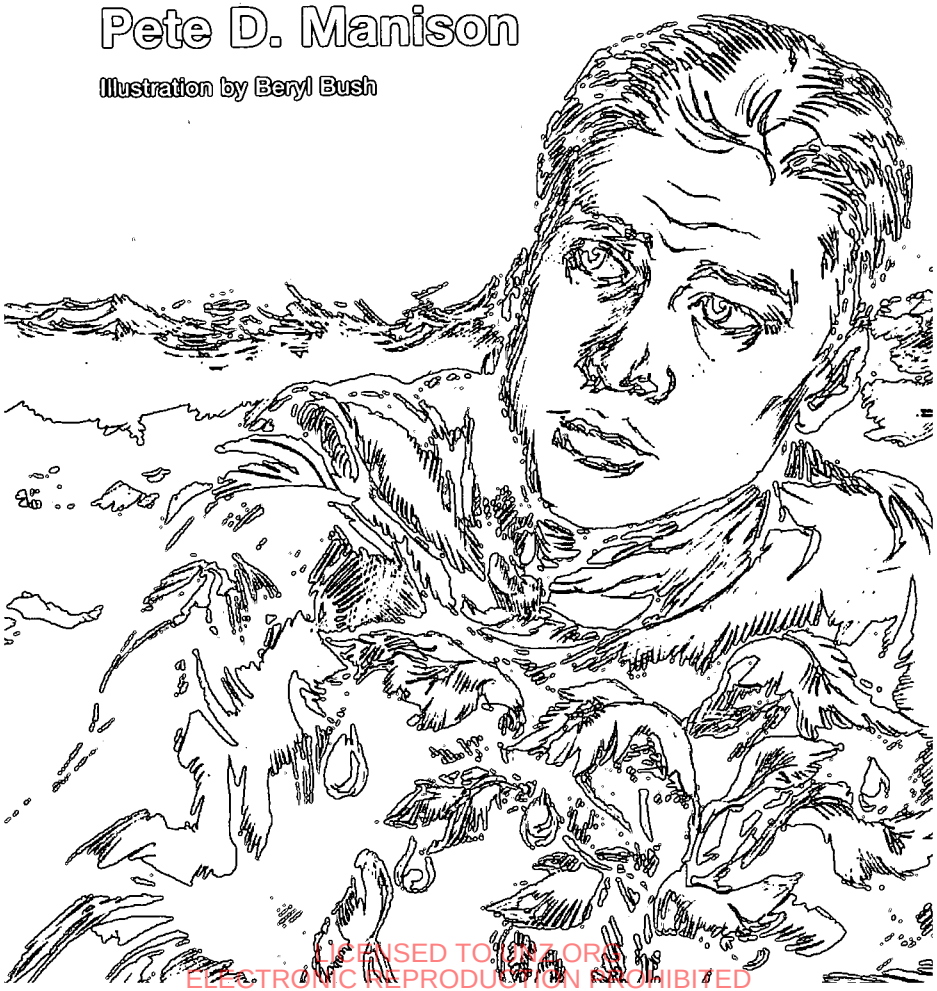
WHO NAMES THE LIGHT?

Pete D. Manison

Illustration by Beryl Bush



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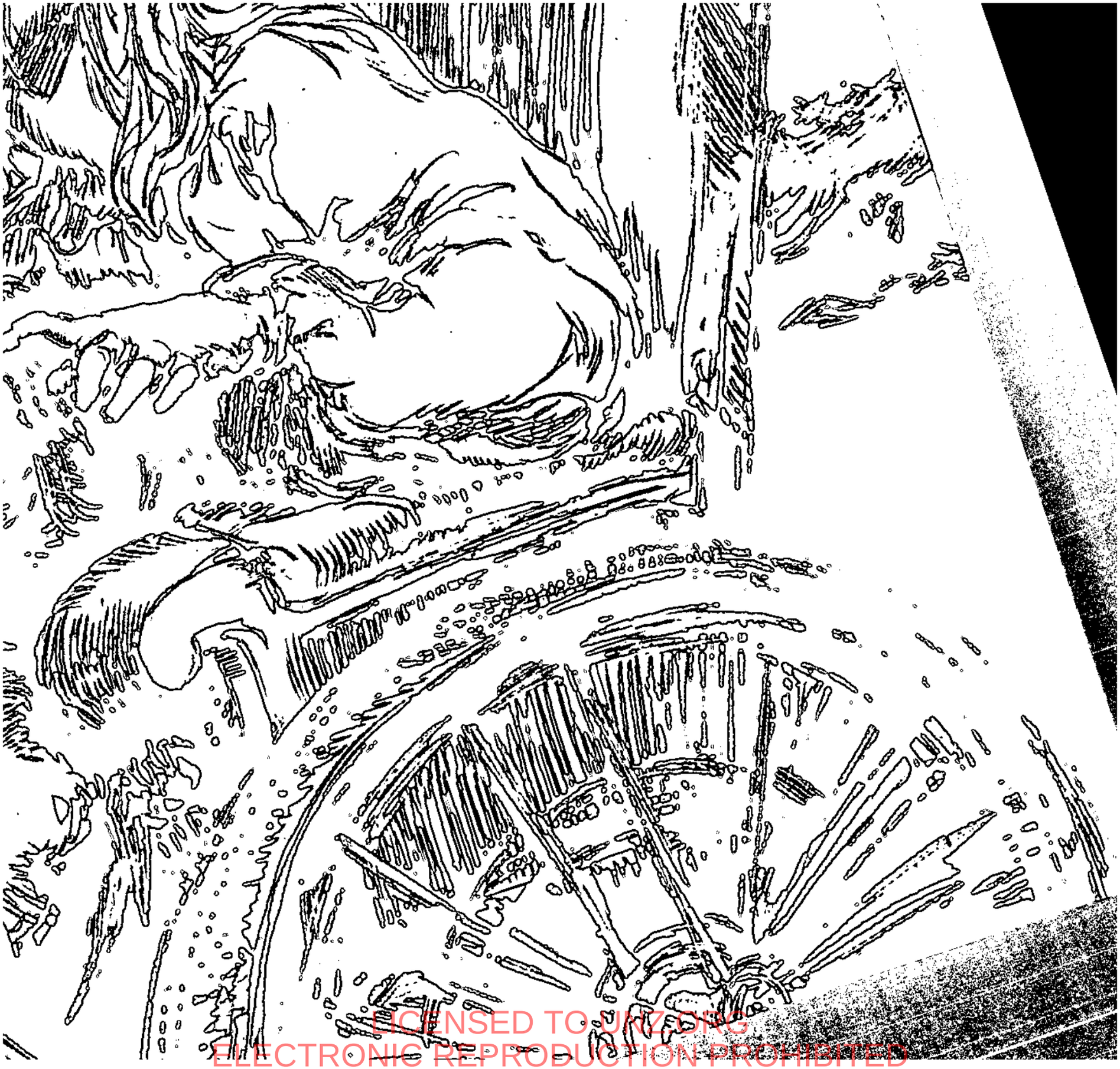

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welcoming commit-
could call it that—was a
that little man with a sun-pink nose
and a colorful cloak obviously thrown
on in some haste, since only one of the
collar snaps was fastened.

"You have no Earth-heart on this world, to notify you of such things?"

The pink-nosed man withered. "Yes, good sir, we surely do possess an Earth-heart. And wise it is, too. But the acolytes who attend it, alas, an unreliable lot. Even now one has gone missing, and—"

Sentience raised a hand to halt the man's babbling. He gave a telepathic command to his ship, and behind him the landing ramp retracted.

[Monitor the situation,] he instructed the ship. [Something doesn't feel right.]

Then he followed the little man across the pavement to the others, who stood in a knot jabbering and pointing at his ship.

"Have you people never seen a starship before?" he asked when he entered their midst, a full head taller than the tallest.

for

arth or the music

Blank stares.

"Kithera."

"That is the name Sentience smiled. he decided. Clearly the taking things slowly.

"I am Sentience-17, Nomenclature. I invoke have come to name the co your sky."

Whispers, reverent n sensed concealment, confus he queried.

[No hidden weapons,] Ship at once. [No hostile intentions.

Sentience relaxed a notch. H was not threatened, at least. It throw off his entire timetable were forced to grow a replacemen

"Good people of Kithera, wha you in acceptance of the honor I b to your world?"

Silence. Nervous glances. At the u ing of the others, Pink-nose stepped r luctantly forward. "It's just that, gooc Caller sir, we thought . . . that is, you . . ."

"Out with it, man!"

Pink-nose finally looked him in the eye. Sentience was certain he saw tea

"You arrived twelve days ago

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* * *

Sentience put the story together as Pink-nose—his name turned out to be Astion Freen—escorted him to an inn in the local village, where he would lodge until the Hospitality candidates had been filtered and Ship had decided on more permanent accommodations.

"We had no reason to suspect falsehood," Astion said. "After all, what profit in impersonating a Starcaller?"

Sentience nodded, his eyes taking in the village streets with liquid, practiced strokes. Agricultural world, hitech limited to weather control and genetweaking the indigenous flora and fauna. The Earth-heart and its acolytes would handle such activities, while the bulk of the population would live in a world not unlike preindustrial Earth.

"Imposters are not as uncommon as you might think," Sentience said. "Usually it's simple greed: Invoking Hospitality gives them a free ride, which they can stretch out indefinitely by moving from one family or town to another. Sometimes it's more involved with delusional behavior, wish fulfillment, but that's rare."

Astion looked embarrassed. "We should have suspected when he explained the absence of a ship by saying it was visibility-cloaked. We're not very knowledgeable about such things."

Sentience grasped his shoulder. "You are a trusting people. That is a favorable quality."

The little man beamed.

Alone in his new quarters, Sentience put the issue of the imposter aside for the moment. It was a nuisance, not to mention a felony, but he had more urgent tasks to consider. Time dilation had dated what information the Order had given him on this world and its people. When the time came, he would travel among them, absorbing their texture firsthand. Only when he felt the pulse of their blood in his veins, when he knew the taste of their sweat and the color of their dreams—only then could he perform his sacred task.

[Ship?]

[Waiting . . .]

[Planetary report, please.]

[Kithera, designation ES-179-2. Diameter: 14,281 km. Average temperature: 23C. Type: terrestrial. Distinguishing features: equatorial methane volcanoes separating habitable north and south polar regions. Methane eruptions and resulting firestorms render equatorial zone between twenty degrees north and south latitudes uninhabitable.]

Sentience nodded. Nothing new there. [Colony history?]

[Seedship arrival: 2197. Selective education by Earth-heart to standard variance. Frontier mentality evidenced, rapid population growth and expansion.]

Sentience had the scent of it now: the excitement and hope of a people with a world to conquer, a civilization to build.

[Technology level?]

[Two. Earth-heart awaiting population stabilization at twenty million before releasing level three technology. Estimated time factor: five years.]

Some stability then, before the next set of changes. That, too, suited his purposes.

[Any dirt, Ship? Give me the juicy stuff.]

[Civil unrest, early second generation. Ended by Earth-heart intervention. Total dead: twelve thousand.]

Sentience felt emptiness in his chest. So many dead. Ship had grown him with enhanced empathy, so that though he was forbidden from forming personal attachments, he felt for each precious life. They were all his children.

[Deviation from planned cultural evolution?] he asked.

[Minimal. Further turbulence prevented by minor genetweaking of third generation embryos. No current threats to security.]

[Premature stellar designations?]

Ship reported. Constellations identified by the Settlers included a number of

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potential troublemakers, perhaps none as insidious as the Watching Eye. A single G-class star, it was the brightest in the northern sky. Parents tucked their children into bed at night with tales full of dire warnings of the consequence of bad behavior. The Eye saw everything, knew your most shameful secrets, watched you when you thought no one was there.

[The beginnings of Settler's Paranoia?] Sentience inquired.

[Perhaps.]

[I'll soon rectify that.]

Sentience noticed movement through the window. Colonists had clustered across the street, watching his room and speaking in quiet tones. Reverence, even awe, were attitudes Sentience had encountered often enough in his travels. This felt different.

He turned from the window.

To them he was a mythic figure, this eternally young man from the sky, this namer of constellations. The Order encouraged such attitudes. His was a sacred task, after all. Societies had proven extremely sensitive to place names, designations of plants and animals, but above all else to the names given the stars. Macroscale effects were rare: war, religious transformation. It was the trillions of smaller influences that often mattered more.

How many hunters had Orion spawned?

After the self-destruction of the first wave of extrasolar colonies, the Order of Nomenclature had been established to make use of these subtle but powerful forces, to help a world refine its character while guiding it away from the hidden pitfalls that littered the road from Raw Frontier to Mature Civilization. And if a few had to pay with lives of loneliness, wandering forever among the stars, wasn't that a fair price?

Sentience squelched his self-pity. He was here, now, solid ground beneath his feet, gravity tugging on every organ, the smell of dust and living matter in his nostrils. He glanced again at the group that watched him from the street. There seemed to be even more of them now.

[Ship?]

[Waiting . . .]

[Quick search. Any cultural anomalies associated with my presence here?]

[Working . . .]

Some of the people appeared engaged in heated debate, if he read their gestures and body language correctly.

[Match found.] Ship's voice tickled across his brain.

[Report.]

[Longstanding myth, origin: first generation. Content: a false Starcaller shall come among the people. Prophecy: the true caller will come from the sky, and only after he has killed the imposter may the stars be named.]

KNOW THE IMPORT OF YOUR ACTIONS. MIND PROCESSES REALITY BY CREATING AN INNER ICON TO REFLECT EACH OBJECT IN THE ENVIRONMENT. EACH ICON CARRIES A LABEL, AND EACH LABEL TRIGGERS A PSYCHOLOGICAL RESPONSE. *SWAN* EVOKES ONE EMOTIONAL STATE, *TORNADO* ANOTHER. AS MIND IS DRIVEN BY THESE RESPONSES, SO IT IS PROGRAMMED BY THE CREATOR OF THE ICONS AND LABELS.

—*Starcaller's Way*, Chapter 3

To the south, mountain ridges flashed into existence and then vanished, their stark lines returning in silhouette each time the orange light filled the sky. Firestorms. At this latitude, they sometimes outshone the daytime sun.

Sentience had walked one hundred meters from the farmhouse. From here the single illuminated window of his room looked like a candle flame. The family had retired early, as farming families tended to do, though Ensa, the couple's only child, had protested.

"I want to talk to the starman! I don't *want* to go to sleep!"

Sentience smiled. Bound to a wheelchair by her illness, Ensa's tiny form overflowed with enthusiasm. It saddened him, suddenly, and he wondered

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why Ship had chosen these people out of the hundreds of Hospitality volunteers. He thought of sending a mental query, stopped himself.

It had no bearing on his mission.

Here, near the southern boundary of the habitable zone, the stars of the northern hemisphere lay spread across the sky in all their glory. There, a tight grouping in the shape of an octahedron. There, a long sweep of evenly spaced second-magnitude suns bisecting the galactic disc. There, a single bright solitaire whose golden light reminded him of Sol. Shapes suggested themselves: an arrow, a six-legged insect, a small human form.

Sentience cast off these impressions. The time had not yet come. Only after he had absorbed this world, come to know its people intimately, would he let the star-trance take him, to set forever the names and symbols that would become etched into the soul of this world.

A flash brighter than the rest lit up the sky, orange to yellow to white. When the methane burn winked out, afterimages of the horizon remained on his retinas.

His thoughts returned to Ensa. Here, as in all new colonies, the family structure was altered to allow for rapid population growth and control over genetic variables. Couples or individuals qualified by various criteria to become guardians, and the colony's Earth-heart brought a number of new colonists to term—embryos conceived, altered and nourished deep within its organomechanical labyrinths. With robotic assistance, an individual was often charged with raising as many as two dozen children.

The Jordaines—Ensa's parents—represented a small faction who rejected this process in favor of natural conception. Ship had designated them *primal humans*. The Jordaines had forfeited the lucrative incentives the Earth-heart dispensed for participation in the embryo program, and while their choice remained within the law, it was frowned upon by most.

Sentience felt a tightness in his chest. Their way would have been difficult enough, even without the congenital defect that could only end in the eventual death of their child.

He took a deep breath, tasting the volatiles in the air. No emotional attachments, that was the rule. He was here for the work—only the work. His empathy must resonate with Kithera's people as a whole, never with a single individual.

Ship had raised him well, in this incarnation as in all others. He spent the long voyages between worlds in study, mental and emotional conditioning, so that he became with each lifetime a finer tool of the Order. Long ago had he learned to understand personal motivations better than those caught in their grip. A high degree of control over his own thoughts and actions, instincts and reflexes, allowed him to reveal only as much of himself as he chose. The care he took in every action reflected the import of his decisions. There had been mistakes in the early days of the Order, worlds damaged or destroyed because of the subtlest of errors. It was vital they not be repeated.

Ship was searching for more data on the imposter, his identity and whereabouts. Meanwhile, Sentience would settle in here and begin the long task of assimilation.

The sky lit and stayed lit, orange and bright, long enough for him to see the dark shapes moving beyond the mountains. Automated methane extractors, pulling fuel for the Earth-heart. Ensa called them dragons. She said they guarded the world of the living from the red, fiery land of the dead.

He spent the next day with her, telling himself he was simply using her as a lens through which to view her world. Not believing it for a second.

"Did you really fall down from the

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sky?"

"Not precisely. Ship followed the curve of your world's gravity well into the atmosphere, coming to a controlled stop at ground level. It might be more correct to say that I fell *through* the sky."

Ensa frowned, edging forward and back with a rocking motion of the wheels of her chair.

"Daddy says you're old, that you've been flying through space since before I was born."

Sentience smiled. "That's true. Even without the effects of time dilation—"

"What's time di . . . di . . ."

"Dilation. Ship moves so fast that time changes. My voyage from Cnemian Prime lasted sixteen years from my perspective. In that time, your world went from a small outpost to a colony of several million."

A quick wind buffeted them. So near the methane boundary, the air rarely slept.

"I don't understand."

Sentience patted her head. "It's all right, Ensa. I don't think anyone does, really."

Her eyes were big and blue, innocent. The network of extrasolar colonies, the seedships that constantly pushed outward humanity's sphere of influence, the Extrasolar Initiative with its many Orders working together with a view that spanned millennia—all of this seemed far removed and unreal as he stood there with this wheelchair-bound bundle of curiosity.

And her questions were endless.

"Why are you so tall?"

"I am two meters in height. That is average for a human male."

"Not around here it's not."

"Your planet possesses a gravitational field somewhat stronger than Earth's. Your Earth-heart has modified your people in various ways so that you function better here."

"You mean it made us shorter?"

He nodded. "And stronger. It also enhanced your respiratory systems, giving your people a barrel-chested look and heads that are slightly larger than the norm."

"Are we aliens?"

"What?"

"Are we aliens?"

Sentience laughed. "No, Ensa, you aren't aliens. Your DNA is one hundred percent human. It's just been adjusted to make you better suited for your world."

"Oh."

Together they watched a flock of birds fly past, their long wings slapping the air with short, muscular strokes. They, too, had been altered.

"My Mom says your name is pre . . . sumptuous."

Sentience remembered the mother's detectable annoyance with his presence. Clearly, it had been the father's choice to apply for Hospitality. "We are named by the ship that gave us birth. I am Sentience."

"That's a funny name."

"Well, I think Ensa's a pretty name. For a pretty young lady."

She blushed.

It was true. Her holo had shown a thin, sad-looking girl, fatigue lines under her eyes, dull blonde hair limp and eyes empty of emotion. In his presence, she came to life, her soul shining through and obliterating all trace of the disease that consumed her.

"Tell me about yourself," he prompted. "What did you like to do before you got sick?"

Ensa smiled, and he could see her gazing into the past. "They said I was a tomboy. I told them, 'I'm not a boy and my name's not Tom.'"

Sentience laughed. "Why did they call you a tomboy?"

"Because I used to play with the boys from the Roscalla farm. There's twenty-two of them, all a year older than me. They showed me the secret places, how to use a model rocket to spark a sky-burn. I used to get in trouble a lot."

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"I bet. That sounds dangerous."

She shrugged. "That's what Daddy said. He made me stop playing with them when I got sick."

"Ensa," he asked carefully, "what have your Mom and Dad told you about your illness?"

She squirmed. He sensed complexities fan out into the air around her. "They say I'll get sicker and sicker, but one day it will stop hurting. That I'll be able to run and play like I used to."

Hot pressure behind his eyes. So they hadn't told her the truth, hadn't told her she was dying.

"Well," he said after an uncomfortable pause, "your parents love you very much."

She squinted up at him. "Sentience?"

He squatted down in front of her chair, facing her. "Ensa?"

"Are you real?"

He gave her an exaggerated frown, patted himself all over his body. "I think so," he concluded. "Check for yourself."

She giggled, reached out to poke him on the shoulder.

"Ouch! I'd say I'm real enough. That *hurt*."

"No, silly. I mean, are you the real Starcaller? Daddy said some of the villagers say you're faking."

Sentience rose slowly to his feet. "They do, do they?"

Ensa nodded.

The imposter. Ripples of doubt threatening his credibility. He would have to do something about that.

"What do you think, Ensa?"

She tilted her head, then reached out her arms for him. The tightness of her embrace was the only answer he required.

SETTLERS ARE GENETICALLY ADJUSTED FOR EVERY WORLD. PART OF THIS ALTERATION IS A TENDENCY TO ABIDE BY THE AUTHORITY OF THE EXTRASOLAR INITIATIVE AND THE MANY ORDERS OF WHICH IT IS COMPOSED. *THIS IS A TENDENCY ONLY.* WE DO NOT SEEK TO POPULATE THE STARS WITH ROBOTS. NEVER UNDERESTIMATE THE CAPACITY OF FREE WILL TO SURPRISE YOU.

—*Starcaller's Way*, Chapter 7

Dressed in native garb, Sentience watched from beneath the feed store's awning, keeping the little man in sight while appearing to shop. He'd linked directly with Ship's biomind, risking exposure of his growing relationship with Ensa, to expedite data gathering with regard to the imposter's identity. It had taken all night, but success had come at last.

"Can I help you, sir?"

Stooping to conceal his height, Sentience turned to wave off the shopkeeper. "Just browsing. Thanks."

The man eyed him suspiciously, but Sentience used nuances of body language and facial expression to blur his image. The shopkeeper quickly lost interest.

Sentience returned his gaze to the street to find the little man had gone.

[Ship?]

[Waiting . . .]

[I've lost visual. Which way did he go?]

Hovering unseen high in the sky above, Ship watched with its sensitive instruments. [One block north of your position. Moving slowly, turning now to the west.]

Sentience left the feed store, walked quickly along the sidewalk to the west, then turned north two blocks along so as to intersect the imposter's course. He'd contacted the Order via Dirac during his link with Ship, informed them of the situation, and asked for guidance.

Find out who he is, they had answered. *Find out why he's doing this. Then report back to us for final instructions.*

Final instructions. Sentience knew all too well what that meant. The imposter's actions threatened the delicate balance of this society's evolution. Against that, one life mattered nothing at all.

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[Ship?] He'd reached the next intersection. The little man in the rust-colored cloak was nowhere to be seen.

[He's stopped again. Half a block east of you.]

Sentience moved that way, eyes scanning left to right, looking for . . .

There.

The little man sat at a table in front of a sidewalk café. Sentience watched from the distance. When he'd finished his meal, he paid for it.

So much for my theory, Sentience thought. If the privilege bestowed on a Caller motivated the imposter, he would hardly have paid for the meal.

[Ship? Have you got an identification yet?]

[Affirmative. Facial recognition 99 percent. Patgen Nender, forty-five years old, 5'6", 180 pounds. Profession: farmer.]

Sentience watched as the man left the café and strolled casually toward him. As they passed, Sentience probed him with his heightened senses. A defeated slump to the shoulders. A washed-out sadness in the eyes.

[Point of interest,] Ship continued. [Until his recent dismissal for absenteeism, Patgen Nender served as an acolyte of the Earth-heart.]

Sentience felt his pulse quicken. The post of acolyte was a great honor, on any world. Why would Nender turn his back on that? Why would he call himself Ambiance and pretend to be a Starcaller?

Sentience let him go. Ship would keep tabs on him, for now. There was something here that remained hidden, and before he could proceed he had to find out what it was.

He had work to do.

But how could he name the constellations when someone else was already doing it?

THE POWER OF MYTHIC ICONS CANNOT BE OVERSTATED. INSIDE EACH EARTHER DWELLS A HUNTER, A QUEEN, THE TWINS—A CAST OF CHARACTERS THAT DEFINES AT THE DEEPEST LEVEL WHAT IT IS TO BE HUMAN. YOU GIFT A CIVILIZATION WHEN YOU FASHION A LOVER OR A BRAVE EXPLORER. YOU CURSE IT WITH A TRAITOR OR A RED-EYED AVENGER.

—*Starcaller's Way*, Chapter 5

"Show me something of your world," he told her. "Something unique to this place."

Three weeks into his stay, Ensa had reached the point where some days were worse than others. In the hope of distracting her from her pain and nausea, Sentience had Ship transport them to the south, so near the methane boundary that the heat from the horizon overpowered the sun.

Ensa thought for a time, pointed. "There."

He squinted. "That? It just looks like a plant."

She pouted, rolled her chair over the hardpan. Sentience resisted the urge to help; he'd learned the hard way that she preferred, whenever possible, to do things herself.

"That's because you're looking at it wrong," Ensa said.

Sentience knelt beside the plant and truly looked at it. Broad, jagged-edged red leaves, purple bulbs hanging like frozen teardrops from their tips. Typical morphology for the indigenous methane-breathers Ship had catalogued. But here, within the terraformed zone, the water table should lie near enough to the surface to prove toxic to any native forms.

"Gengineered?" he asked.

She sparkled, delighted that he'd followed the thread. Suddenly he felt like she was the elder, the teacher, and he the wide-eyed student. Did death's nearness do that?

"No," she answered, stubbornly refusing to say more.

"It's adapted," he said, thinking aloud. "Its root system takes up water, and it survives as a terrestrial species. When the methane storms come, it expresses

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its indigenous qualities, breaking the gas down for its carbon."

She giggled, clapping her hands together. "It's like us," she said.

He nodded in appreciation. "Children of Earth, living in harmony with Kithera." Beads of sweat had appeared on her forehead. Without thinking, he bent to blot them away. "What do you call it?" he asked.

"Synthestra," she answered, struggling only slightly with the name.

"I'll remember," he promised.

Their friendship had ceased to be a secret. Ship suspected, and her parents delighted in it.

"She lights up when you're here," Ensa's mother had told him, her enthusiasm a complete reversal of her original reaction to him. "It will be hard on her when you go." She hadn't added the obvious qualification. Sentience had not interfered to question the wisdom or morality of keeping Ensa ignorant of the true nature of her illness. For himself, it was becoming harder and harder to look in her eyes and not tell her the truth.

"Ensa," he said now, sensing her waning strength and wanting to bolster her, "show me something else."

"Like what?"

"Show me something you've never shown anyone else."

She frowned, thinking hard.

"It's important," he encouraged her. "You'd be making a great contribution to my work."

She scrunched up her face even tighter, then suddenly relaxed into a smile. "I know."

She led the way toward a dome-shaped knob of protruding bedrock that hulked over the surrounding flatlands. He didn't see how they could climb it, and almost summoned Ship before Ensa showed him the gentle switchback up the eastern flank. Ruts from her wheelchair betrayed the frequency of her visits, but she'd grown weaker since then. Near the summit, she faltered, reluctantly allowing Sentience to push her chair up the final incline.

At the top, he sighed in awe. He could see for miles, out across the checkerboard farmlands to the north, south to the roiling orange clouds that scudded westward from the massive purple cones that spawned them.

And moving among those clouds, feasting on the breath of volcanoes, floated the massive gray shapes of the automated methane harvesters.

"Dragons," he sighed. He glanced down to catch the gleam of tears in her eyes. "Thank you, Ensa. Thank you for sharing this place with me. It will be our secret."

A brilliant flash seared the sky, followed in mere seconds by a low, throaty rumble.

"Storm coming," Ensa commented, her voice strangely empty of emotion. "We'd better get back to the farm."

Sentience looked out at the approaching wave-front. Where oxygen and methane mixed, the sky was burning.

He summoned Ship.

MIND CANNOT LEAVE A THING UNNAMED. WHEN YOU ARRIVE AT A DESTINATION, THE SETTLERS WILL, IN WHOLE OR IN PART, HAVE EVOLVED THEIR OWN SET OF PATTERNS AND NAMES FOR THE STARS THEY SEE IN THEIR SKY. THIS WILL RARELY PRESENT A PROBLEM, AS EACH COLONY'S EARTH-HEART WILL ENDORSE YOUR NAMING, AND THE OLD LABELS WILL SOON FADE. IN RARE CASES WHERE RESISTANCE IS MET, CONSULT THE ORDER FOR AUTHORIZATION TO EMPLOY MORE AGGRESSIVE METHODS.

—*Starcaller's Way*, Appendix A: Practical Matters

[Why are you here?]

The Earth-heart touched his mind with none of the gentleness of Ship, thrust its thoughts into him with all the subtlety of rape.

Sentience opened himself. This was not his first encounter with an Earth-heart; he knew the futility of resistance. "I have a special request," he said, speaking aloud as a gesture of defer-

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ence.

Lights winked on and off in the cavernous space. Membranes billowed and organs pulsed. The smell of blood and machine oil merged into something that was both, neither.

[Your work on Kithera has barely begun. Does such a diversion serve the Order?]

"It's a personal matter. As a Starcaller, I invoke my right to Audience."

[Granted. You may speak.]

Around him in the gloom, things moved, machines and gengineered creatures performing their tasks in silent symbiosis. The Earth-heart covered a hundred acres at the center of the colony's largest city. Its functions included manufacturing, terraforming, cloning of new colonists, mining and processing of materials. Its biomind functioned in a manner not unlike Ship's, though a thousand times more powerful. It consisted of bank after bank of the fastest processors and computer memory archives melded with the replicated brain matter of humans ranging back to before the first wave of extrasolar colonization.

"You are familiar with the case of Ensa Jordaine?"

[I know all my children. Ensa is a special daughter. Her spirit possesses great vitality.]

"She is gravely ill."

[I am aware of this. She suffers from a congenital defect beyond repair by the colony's current medical technology.]

"But easily corrected using more advanced techniques stored in your archives."

[Level four technology would be required for her treatment. Level three technology is scheduled for release in five years. The next release is projected at two centuries. This far exceeds Ensa's lifespan.]

"I'm not asking you to accelerate the colony's development. But you have it in your power to save a single life."

[You request Special Intervention?]

"As a member of the Order of Nomenclature, I have that right."

[But do you formally exercise it? There is a difference.]

"Yes, there is. And yes, I do."

The Earth-heart paused. Sentience felt a change in air pressure, an increased vibration to the floor as if in some distant chamber machines had clicked into overdrive.

[You have become emotionally attached to this girl. You have compromised your objectivity. The Order will be informed of your lapse.]

"Be that as it may. Will you save the girl?"

Again, an increase in activity—the ticking of relays, the winking of lights. Then, abruptly, silence.

[No.]

Sentience felt a sensation he had not known in many lifetimes. His pulse quickened; his palms became moist. Fear?

"But why? What purpose can her death serve?"

[Emotional attachment clouds your thinking, distracts you from your vital task. This issue is peripheral to your purpose here.]

"My task will be performed, as it always has. Check my service record."

[I have already done so. It is only the exemplary nature of that record that prevents my requesting a new Starcaller.]

Sentience felt his knees tremble. This was uncharted territory. His conditioning told him one thing, his heart another. "Will you really let the girl die?"

[That subject has been resolved. A new one waits to be addressed.]

"Explain."

[You have been scanned since the time you entered my body. This man has never strayed from your thoughts.]

Holoprojectors threw an oversized image of Patgen Nender into the air in the center of the chamber.

"The false Caller."

[He was one of my acolytes, trusted

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with great responsibility, recently gifted with offspring. Now he has become deviant, destructive.]

"I've addressed the situation."

[I find your actions inadequate. From your mind I have taken his location. While we spoke I had him apprehended.]

Sentience felt emotions rising in him, relied on his training to suppress them. Opposition to the Earth-heart was a nonproductive course.

"This is your world. You will do as you deem appropriate."

[Turn around.]

Sentience did. There, beyond the sphincter that opened to reveal a deeper chamber in the living construction, Patgen Nender struggled against the robots that restrained him.

Sentience sighed. Coming here had been a mistake. "What will you do with him?" he asked quietly.

The Earth-heart pulsed and whirred. [An acolyte who has rejected the honor bestowed on him can only be a defective specimen. I will study him to determine the nature of the defect.]

"And then?"

[Then I will recycle his flesh.]

Ensa looked smaller than he remembered. The wheelchair seemed to swallow her.

"You're sad," she said when he sat in the chair beside her oxygen machine. How had this happened to him? His work treated worlds, spanned millennia. Never before had he allowed such an attachment to overwhelm his sense of duty. And now, he would go where he had no business, do what her own parents had chosen not to do . . .

"Ensa, I have something to tell you."

She reached out to take his hand, her eyes looking up at him, big with concern. "You're going away, aren't you?"

Pain in his chest. Was the body wearing out already? No, it was too soon for that. "Something else."

She gripped his hand more tightly. "It's okay. We're friends. You can tell me anything."

He remembered the place of dragons, overrun now by the advancing stormfront, the violence that burned the sky beyond the sealed window. It could last for weeks, they said. Would she even live to see that place again?

"Well," he began, "that's what makes this so hard. Because we *are* friends. And friends don't like to hurt each other, right?"

She nodded.

"But friends tell each other the truth, too, don't they?"

She nodded.

"So if a friend has to choose between not hurting a friend or telling her the truth, what does he do?" Again, he felt like the child, as if her proximity to death gave her an insight denied to him. Immortal, would he ever understand what she saw?

"You have to tell the truth," Ensa finally said. "Pain is only for now. Truth is for all time."

He smiled at the simplicity of it. "You know how your Mom and Dad say you're going to get better? That one day you won't be sick anymore?"

She nodded.

"I think what they mean is, someday—someday soon—your suffering will come to an end."

She swallowed. "You mean when I die."

"I'm sorry, Ensa. I'm so very sorry. But you're not going to get better. I thought someone should be honest with you."

Something told him her sadness wasn't for herself, but for him. "I know. I've known for a long time. Mom and Dad, they wouldn't tell me, but I knew."

"They only wanted to protect you. They love you very much."

She looked down. "After I got sick, people started bringing me presents. Neighbors. Kids from school. People who never even *talked* to me before."

"They were only trying to make you feel better, Ensa. Trying to make them-

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selves feel better."

"I know. I got sick and I'm dying, and they bring me stuffed animals. But I'm still dying. I just thank them and smile, and hope it makes them happy."

Sentience felt that hot pressure behind his eyes again. "Ensa, you're a very brave little girl."

She shrugged. "Not really. There's nothing else I can do, is there?"

He could think of nothing to say.

"Sentience?"

"Ensa?"

"Is it true that you live forever? That's what the stories say. Sometimes it's hard to tell what's real and what's made up."

He shook his head. "Callers don't live forever, Ensa. No one does. But we do . . . continue, in our own way. It's necessary for the work."

Her blue eyes held puzzlement, but they seemed also to reflect acceptance that some things lay beyond her understanding. "Sentience?"

"Ensa?"

"Will I . . . continue, too?"

He stroked her hair, curled it behind one ear. "No. Not as I do."

"Some other way, then?"

A few strands of hair, dead and dry, had come away in his hand. He pretended not to notice. "I wish I knew, Ensa. I really wish I knew."

That night, he couldn't sleep.

[Ship?]

[Waiting . . .]

[Have you gotten any more information on this Patgen Nender?]

[Affirmative. I now have access to Earth-heart records.]

[The Earth-heart mentioned something about offspring. What do you have on that?]

[Twenty-four identical clones released Colony Year 97. To be raised by Nender with robotic assistance.]

[He's a father?]

[Not any longer. The children perished in a methane storm seven months ago.]

* * *

NO EARTHER CAN COMPLETELY APPRECIATE THE RELATIONSHIP BETWEEN A SETTLER AND THE STARS. TO ONE, THE CONSTELLATIONS ARE OLD FRIENDS, WOVEN SINCE ANCIENT TIMES INTO THE FABRIC OF THE SOUL. TO THE OTHER, THEY ARE ALIEN LIGHTS IN AN ALIEN SKY, SOMETHING NEW DEMANDING AN ANSWER, A SOLUTION, A SIGNIFICANT PATTERN THE EYE AND MIND CAN RECOGNIZE. THESE STRANGE LIGHTS IN THE SKY CAN SEEM TO THE INNER PSYCHE A SIGN THAT THINGS ARE TERRIBLY WRONG. THE RESULTING DISORDER, SETTLER'S PARANOIA, HAS RESULTED IN MORE DEATH AND DESTRUCTION THAN ALL WARS AND NATURAL CATASTROPHES COMBINED.

—*Starcaller's Way*, Chapter 9

The landscape flashed by beneath him, rocky erosion terrain near the boundary zone, methane-breathing vegetation visible as rust-colored smears reaching toward the patterned green of the farmlands.

[Ship?] asked Sentience. [Are you with me on this?]

A pause while the biomind weighed priorities. [I am your Ship, Sentience. Your actions violate protocols, not to mention laws. Were the Earth-heart or the Order to learn the full story, your days as a Caller would be over.]

[But they won't learn it, will they?]

The firestorms fell astern as Sentience banked north, toward the capital city.

[Doubtful. The Earth-heart is a brilliant construction, but it contains thousands of discrete mental entities. Several of them are sympathetic to our cause. They will assist us from within.]

I hope it's enough, Sentience thought, keeping his fear hidden from Ship. The damage, if what he was planning failed, would extend far beyond his own life. The evolution of this world would be jeopardized.

[I have the city on my detectors,] Ship reported some time later.

[And the Earth-heart?] Sentience queried.

[It takes no notice of us. Our allies within have done their work well.]

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Allies within. Biomatter from the days of the first colonization wave. Minds tempered by grief and loss, possessing a unique perception of the value of every single life.

Ship had chosen well.

And so no defenses threatened them, and the Earth-heart remained silently oblivious as a tiny ship darted in, scanned it, and then docked with one of its chambers, where a single prisoner slept, dreaming of his own loss.

"This is incredible!"

Patgen Nender's excitement filled Ship's cockpit, making the very air seem to buzz.

"It's magic! You can do *anything! Go* anywhere! Ship, take us to the second moon."

[I respond only to Sentience.]

"Who said that?"

Sentience smiled. "And you wanted to be a Starcaller."

Patgen blushed. "A thousand apologies, good sir. I intended no harm. It was simply . . ."

The enthusiasm drained from him, and once more Sentience saw the lines of regret that darkened the little man's face. He reached over to touch his shoulder.

"I know about the children," he said softly. "I'm sorry for your loss."

Words tumbled out of him. "As an acolyte, I should have taken it in stride. The Earth-heart offered to adjust me so I wouldn't feel the pain. I didn't want that. Can you understand?"

Sentience thought of Ensa. "I think so," he said.

"I learned of your scheduled arrival, and that gave me the idea. I was always down at the pub, telling tall tales of the air-fish that got away. So when I traveled to a town where nobody knew me, dressed in strange clothes and claimed to be a traveler from afar come to name the constellations, people believed me. That was when I knew I could do it."

"Didn't you know you'd be exposed when the real Caller arrived?"

Patgen snorted. "It's all so different for you. You travel to other worlds; you see the big picture. Here we lead a simple life. Most folk believe Kithera is *the* world, that Earth and all the rest of it's a myth. Even as an acolyte, I never seriously believed you were *real*."

Sentience shook his head in disbelief.

"So I stole an armful of gadgets from the Earth-heart, put on a lightshow in a couple of villages, made them believe in me. Word of mouth did the rest. I could have succeeded—if you hadn't shown up."

Sentience frowned. "You have no idea of the weight of the task you contemplated. A million subtleties—"

"—inflect the psychology of Settlers and the sociology of their colonies. Sensitivity to the smallest of these is a prerequisite to any Calling."

Sentience stared in astonishment. "*Starcaller's Way*. You—"

"I was an acolyte of the Earth-heart," Patgen reminded him. "I had access to all the information I needed. Believe me, Caller, my work, while not as practiced as your own, would have been far from slipshod."

After a moment of silence, Sentience nodded. "Perhaps. We'll never know for certain. What matters now is our next action. This legend of the False Caller has me worried. Ship?"

[Destination?]

He couldn't go back to the farm; that would be the first place the Earth-heart would look.

[Anywhere,] he told Ship. [Find a remote village.]

[Plotting course . . .]

[Wait. First I'd like to show our guest something to make the trip worthwhile.]

[Understood.]

G-force caressed them.

"What I don't understand," Sentience said, "is *why* you did it. You threw away a life of privilege, and for what?"

Sadness in the little man's eyes. "I lost

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them. That demon of a storm came out of nowhere and took them away from me. I couldn't bring them back; I couldn't correct my mistake. But I could still give them something."

Sentience felt a tingling in his scalp.

"I could name the constellations after them. I could make certain that my lost children were never forgotten."

Abruptly the g-force abated. They floated in their seats, weightless. Patgen chortled in delight as he gazed down at the sphere that turned in space beneath them, the whole of the world, seen as no living inhabitant had ever seen it. Sentience thought of Ensa. How he would like to give her this gift.

Ship broke into his thoughts. [Sentience, we have a problem.]

PERSONAL RELATIONSHIPS ARE FORBIDDEN FOR A REASON. IF, HAVING COMPLETED THIS CURRICULUM, THE ASPIRING STARCALLER LACKS UNDERSTANDING OF THIS, ONLY EXPERIENCE WILL BRING PAIN ENOUGH TO HAMMER THE LESSON HOME.

—*Starcaller's Way*, Appendix C: Final Reminders

The occupants of several nearby farms had already evacuated, and the Jordaine home echoed with the voices of displaced and frightened people.

". . . already farther north than any storm in history."

"The roads to the city are cut off."

"The Earth-heart has acolytes en route, but what can *they* do? Tame the elements?"

Sentience had arrived with Patgen Nender to find the men out in the yard erecting barriers against the storm, the women and children inside handling the provisions and trying to maintain order. At first he didn't see Ensa, and his heart fell. Later, he found her in her room.

"What are you doing?" he asked.

She clutched him tightly when he bent to hug her. She had a wall panel open and appeared to be splicing something into one of the house's air ducts.

"I'm patching my oxygen machine into the ventilation system. In case the house needs help with all the extra people."

"Ensa . . ."

"It's okay. I don't need it."

"Pardon the intrusion." Sentience turned to see Patgen Nender standing in the doorway. "The acolytes have arrived. This is getting . . . uncomfortable."

"Ensa, I'd like you to meet a friend of mine."

She bowed her head in a very ladylike fashion. "So you're the one who says he's a Starcaller."

Patgen grimaced. "A harmless deception, I assure you."

Raised voices from the main room carried notes of anger through the walls.

"Not so harmless," Sentience said. "Ship manipulated the Earth-heart, but we can't *both* be the Caller."

"The prophecy," Ensa whispered.

Sentience shook Patgen's hand. "It's been a pleasure knowing you," he said, smiling. "Now I'm afraid I have to kill you."

The lights flickered as rolling thunder shook the windows. A glance at the methane detectors showed the house had kept its atmospheric integrity.

"Caller!"

Both Sentience and Patgen looked up as an acolyte burst into the room.

"The Earth-heart directs you to use your ship to evacuate the farm."

Sentience frowned. "No time for that. Ship can only transport four at a time, and the storm is upon us."

"You dare question the Earth-heart?"

"I have a better idea."

"Tell me."

Sentience ignored the acolyte, took Patgen by the arm. "I need your help."

"You have it."

"Sentience?" Fear colored Ensa's voice.

"Stay here, Dragonwatcher. And trust me—no matter what happens."

He pulled Patgen along with him, out of the bedroom, through the chaos of

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the common room and out through the air-seal. Patgen coughed. Methane was odorless, but its presence was immediately apparent as lungs labored to find oxygen to breathe.

[Ship?]

[Waiting . . .]

[Sweep in low. Pick us up.]

The wall of fire filled the sky now, singeing the hair off Sentience's exposed flesh. Ship's silvery shape appeared overhead, buffeted by the winds.

Once onboard, his task took mere seconds. He reconfigured Ship's force field to cover the farmhouse, then boosted the power to make certain it would hold.

[You should stay inside me until it subsides,] Ship urged when he rose to leave. [I predict a crisis which—]

[Ship?]

[Yes, Sentience?]

[Shut up.]

[Yes, Sentience.]

He and Patgen returned to the farmhouse.

"We should be safe now," he told the crowd. "We have only to wait until the storm passes."

Murmurings moved through the crowd like a wave. Sentience noticed eyes moving from Patgen to him, back again.

"Is there a problem?"

Louder voices cut through the murmurings. The acolytes. "The Earth-heart is in a state of confusion. It speaks of tampering. It says only one of you can be the true Caller, but it doesn't know which."

"By the Watching Eye, one of you is a liar!"

"Imposter!"

"The prophecy says one must die!"

Sentience tried to calm them, but the urgency of the storm and their deeply held beliefs were too strong. They began to advance, and he saw that their hostility had spread to the others. Only Ensa and her parents, eyes wide with horror, watched in silence from the hallway.

"The false Caller must die before the stars can be named!"

"The stars must be named!"

"Which one of you is it?"

The acolytes, Sentience now saw, carried death-wands.

"Sentience!"

He looked up to see Ensa's tortured face pleading with him. For a moment he thought of himself. He could survive this day, spend with her what time she had remaining, show her the world from space, watch with her as the dragons floated on the fiery horizon.

But no.

His training, his many lives and many experiences, the rigid teachings of the Order—it all seemed insignificant in the light of all he had learned. *It is when we step outside the restrictions,* he thought, *when, knowing the rules inside and out, we choose just the right time to break them, to transcend them, that we are truly human.*

He bowed his head.

"You! It's you!"

He looked up into the amber eyes of the acolyte. "Yes, Brother. I am the one you seek. I've deceived you all. I am no Starcaller. I am really no one at all."

He glanced up to see Ensa's parents, their eyes filled with horror. But the girl only nodded, pride making her face radiant. She, at least, understood.

The blasts from the death-wands pushed him backward, knocked the wind out of him. Pain raced along every nerve pathway as he crumpled to the floor. His vision faded and silence pressed in on his ears. When he perceived the world again, it was Patgen Nender he saw bending over him.

"Why?" the little man asked, eyes pleading for understanding. "Why did you do it?"

Sentience tasted blood in his mouth. "Have Ship collect me. The rest is for you."

Patgen held his shoulders, as if the physical contact could keep him in this

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world. "I don't understand. You sacrificed yourself for me. You're a Starcaller. I'm only Patgen Nender."

"Ambiance," Sentience whispered. "You are Ambiance. You convinced me . . . that you know the way. A world has a right to name its own stars."

Then the ceiling spun, Patgen receded into the distance, and Sentience felt a coldness that was colder than space.

AS A CALLER, YOU WILL KNOW FREEDOM AND LONGEVITY IN WAYS NO OTHER HUMAN HAS KNOWN THEM. YOU WILL ALSO KNOW RESTRICTION AND DEATH BEYOND THAT OF OTHERS. YOURS IS A SPECIAL PRIVILEGE AND RESPONSIBILITY. LEARN TO MEASURE YOUR LIFE BY ITS OWN STANDARD, NOT BY THE FLEETING, HORMONE-DRIVEN LIVES OF THE SETTLERS WHO BRIEFLY INTERSECT IT.

—*Starcaller's Way*, Appendix C: Final Reminders

[Starter cell nucleus activated. Accelerated growth matrix established. Waiting . . .]

Warmth. Light. A sense of swelling, expanding, articulating first dozens then hundreds then thousands and millions of parts. Time passed. Systems defined themselves: circulation, respiration, digestion. Skeleton, musculature, internal organs—all firmed up and linked into the matrix. Lastly of all, sensory systems tingled to life.

[Growth sequence complete. Removing consciousness blocks.]

A warping, twisting sensation of movement, perception, awareness.

Who am I?

[All systems confirmed within nominal parameters.]

Feelings, ideas. He became aware of himself as a discrete individual, separate from the rest of the universe, yet linked forever to it.

[Infusing with purpose.]

Something filled him, lifted him, gave him meaning. *This is what I am,* he thought. *This is my sacred responsibility.*

He opened his eyes. A place of gleaming metal surrounded him, lights that winked on and off in patterns that implied meaning. It was the thing before him, however, that commanded his attention.

A body.

[Preparing for memory transfer.]

The body was cold, pale. Dead. Its face was creased with the lines of age, unlike his own, and scorch marks on the chest indicated a violent end. As he watched, a needle descended from the ceiling and buried itself in the cadaver's forehead. An instant later, an identical needle descended toward his own head.

He closed his eyes.

And remembered a warm autumn day on Earth. Someone shaking his hand and saying, "Good luck."

A long darkness between stars spent studying humanity's history, its long confinement to a single world, its adolescent fumbling toward mastery of the Solar System, its first ill-fated expansion to the stars.

A world of jungle, a world of ice, a world of fierce magnetic storms and liquid metal seas, a world where crystalline deserts sparkled under three suns. And always, above these worlds, stars. Stars in patterns that suggested meaning, that called on him to name them.

I am Sentience.

Something pushed into his mind, a presence that filled his heart with love.

[Welcome to your next life,] said Ship.

Sentience-18 sat up, his skin still glistening with mucus from the amniotank. He looked at the lifeless body before him, saw only an empty husk. All that he was, all that he had ever been, was here, inside him.

[Recycle,] he ordered Ship.

The body was whisked away in silence. He felt, if anything, only a twinge of regret. That incarnation had ended before its time. Then he remembered Ensa, her smile burning through the pain, and he remembered Patgen Nender, and he felt certain his sacrifice had

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not been in vain. Personal attachments brought suffering: the Order had been right about that. But they brought so much more.

In this way, too, was he reborn.

[Location?] he asked Ship.

[Geosynchronous orbit. Awaiting further instructions.]

Sentience considered. All in all, an interesting experience. Unorthodox to the extreme. Still, he felt confident no harm would come from his decision.

But his work was only half done.

[Ship, set course for the Southern Habitable Zone.]

[Working . . .]

Kithera's unique equatorial divide had led the Initiative to establish two colonies on this world, each with its own Earth-heart, each independent and unaware of the other.

A sky also had two hemispheres. Two sets of constellations to name.

Sentience smiled, wondering what surprises awaited him there.

Patgen Nender drank the air in huge gulps as he reached the summit of the granite dome and looked out at the land below. To the south, methane fires simmered in quiet contemplation, their energies temporarily spent. To the north, the lights of farmhouses dotted the blackness, solitary points so like those that shone down from above on this cloudless, moonless night.

My children, he thought. *How long I have waited for this moment.*

A wave of grief threatened, but he let it wash over him. He was Ambiance now, not Patgen Nender. "A world has a right to name its own stars," Sentience had told him. He took those words to heart now and cleared his mind of mortal concerns as he stretched out on his back to look at the patterns that filled the blackness. To become one with the heavens.

Star-trance.

So important, these lights in the sky. We gaze up at them, project our thoughts and dreams onto their accidental alignments. In them we see reflections of ourselves. Or is it we who are the reflections? Patgen sighed. It would be for those who came after to interpret what he did tonight, to create the myths that would guide their world into the future. To live under stars that were no longer random.

My children.

That tight group of eight stars in the shape of an octahedron. He called it Bellany, after one he had lost. The Scholar.

That line of three that bisected the galactic plane. Rondel, the Protector.

The others came quickly then: Peridias, the Healer; Kelgin, the Provider; Exetl, the Sower of Grains.

Thus did he name them, each for a noble and true Calling, each for a child who had been lost but never forgotten.

And when only the bright yellow solitaire remained, that brightest star of all that filled the sky with its brilliant hope, he remembered his friend from beyond the world, who had understood him, who had believed in him, who had made his dream come true at last.

So he named that one in memory of another child, one who was also lost but would live above the clouds forever. He called it Ensa. Ensa, the Dragonwatcher. ■

It is better to know some of the questions than all of the answers.

—James Thurber

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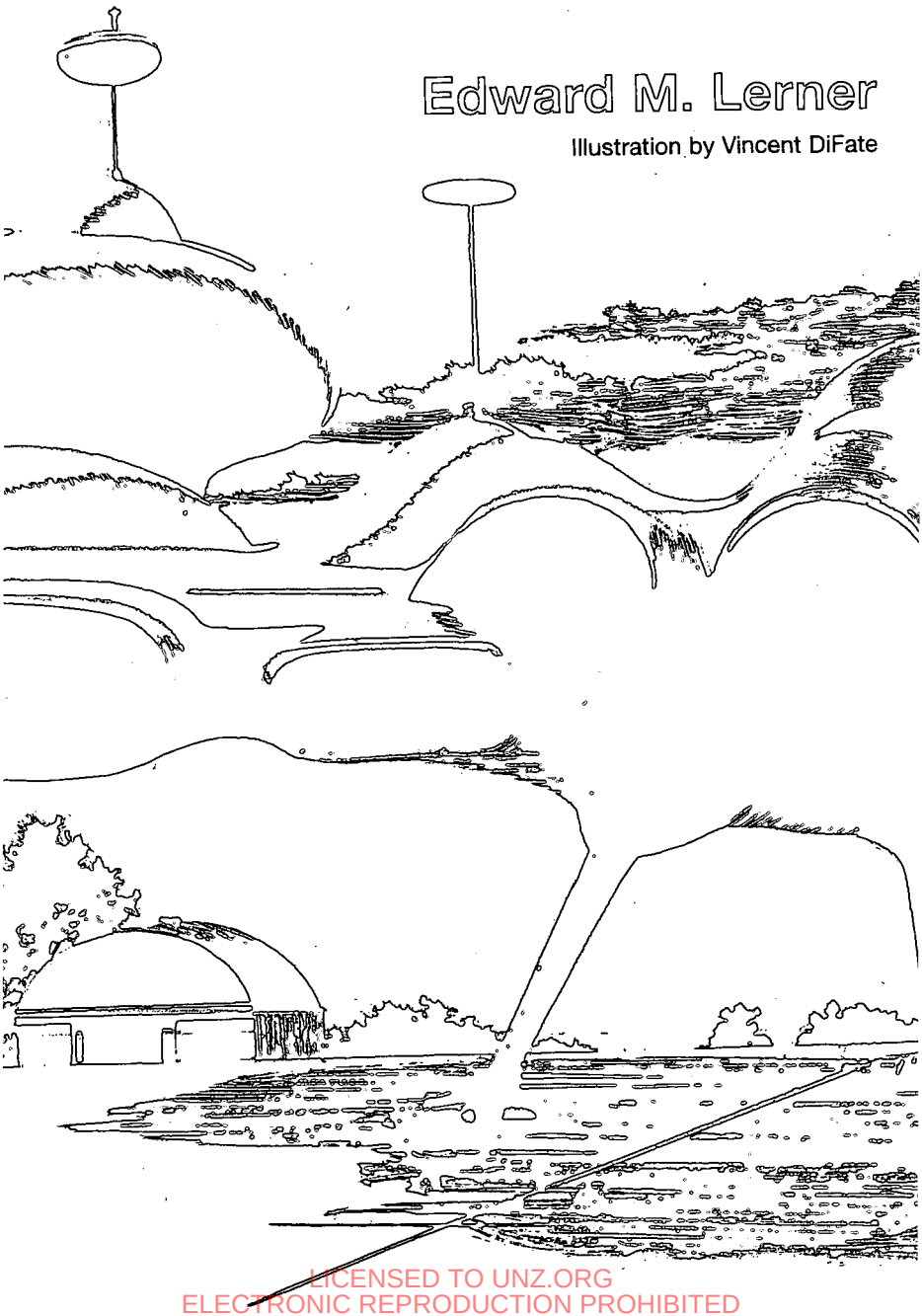
MOONSTRUCK

Part Three of Four

Edward M. Lerner

Illustration by Vincent DiFate



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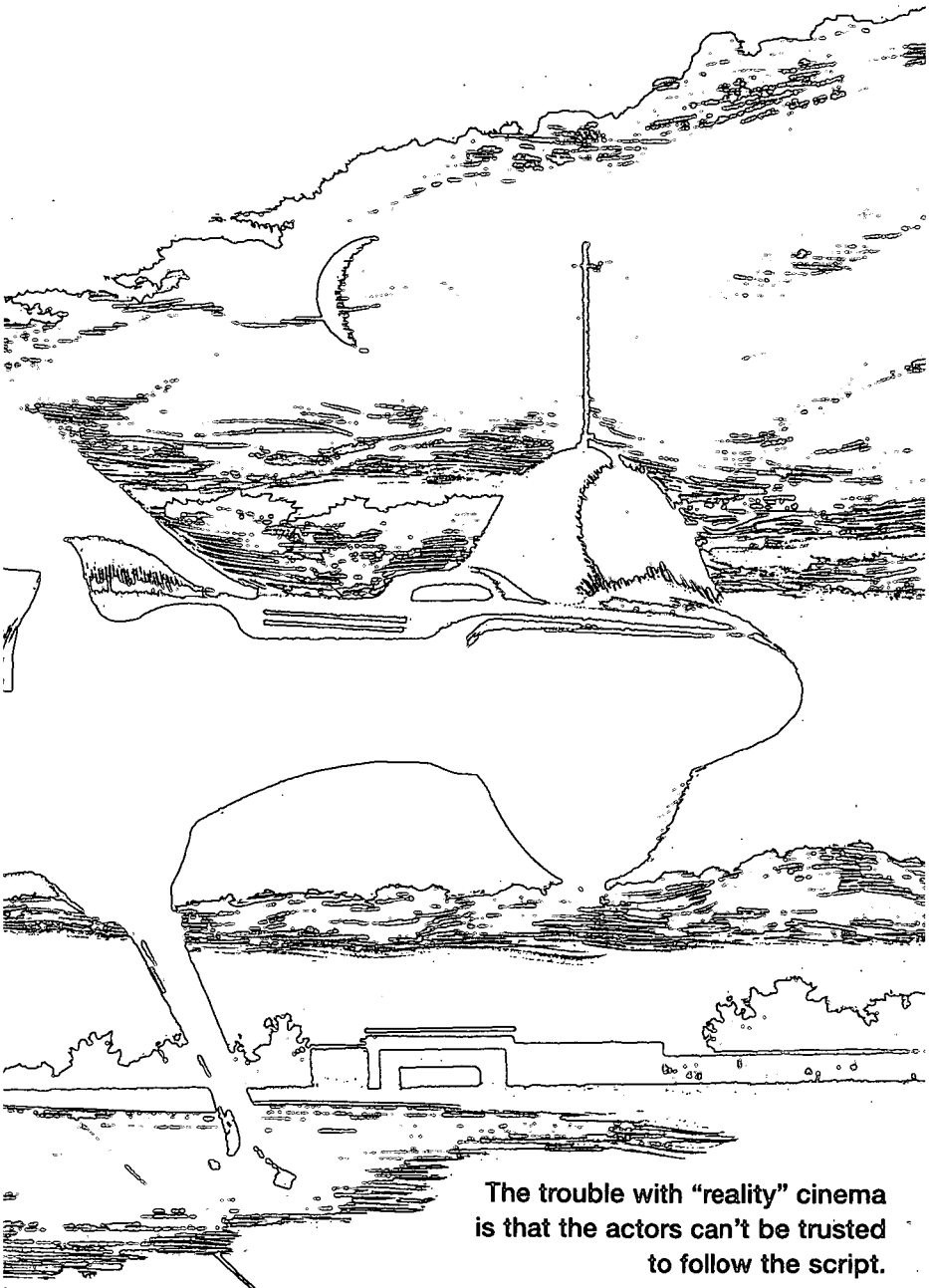

The trouble with “reality” cinema is that the actors can’t be trusted to follow the script.

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Synopsis of Parts One and Two

Presidential science advisor KYLE GUSTAFSON hosts his Russian counterpart, SERGEI ARBATOV, at a Cape Canaveral space-shuttle launch. Atlantis *carries the replacement for the Gamma Ray Observatory mission that ended in 2000. The absence of space ambitions beyond low Earth orbit is a disappointment to both men—especially Kyle, whose love of science began with the Apollo 11 moon landing. Shortly after takeoff, pressure in the shuttle's external tank inexplicably rises.* Atlantis *and its crew are lost in a spectacular explosion.*

Television preemptions herald the arrival of representatives of a Galactic Commonwealth. Kyle briefs his boss and mentor, presidential chief of staff BRITT ARLEDGE: the moon has acquired a satellite more than two miles across. An alien landing craft comes to Washington's Reagan National Airport, where President HAROLD ROBESON greets the embassy mission. The F'thk visitors, led by Ambassador H'FFL, are taller than humans, scaled, and vaguely centauroid.

At a state dinner, the F'thk explain their antimatter-powered mother ship is far off in lunar orbit as a standard precaution. They deflect Kyle's questions about this ultra-conservatism. The state "dinner" is foodless, since F'thk food is toxic to humans—but sensors find no trace of toxins in the ballroom's air. A visitor says of Earth, "No F'thk would invent such dark nights or such a paltry number of moons."

Deputy Undersecretary of State DARLENE LYONS joins Kyle on Washington's Mall, where with great pomp the F'thk donate a "Galactic Fellowship Station." The miniature factory dispenses souvenir orbs symbolizing galactic unity. Darlene wonders why the aliens didn't first visit the UN in New York City rather than a national capital. The F'thk had mastered human languages from radio broadcasts; she cannot believe they were unaware of the UN. The F'thk give orbs personally to all officials with whom they deal.

Kyle is named head of the Presidential Commission on Galactic Studies. Its challenge: evaluate an invitation to apply to the galactic commonwealth. Kyle fast-tracks a replacement for the lost orbiting observatory: gamma-ray production is a hallmark of the matter-antimatter reactions said to power the mothership, and the atmosphere blocks gamma rays. Sensitive videocams in a windowless room whose lights are suddenly extinguished capture ultra-rapid dilation of F'thk pupils. Would such light-sensitive eyes evolve, Kyle wonders, on a world with many moons? The commission votes to negotiate with the enigmatic F'thk, and Kyle resigns in protest. He returns to his former employer, the Franklin Ridge National Lab.

Kyle's alien research is interrupted by an insanity mankind thought it had outgrown: nuclear saber-rattling. Against a backdrop of resurgent Russian nationalism, one American spy satellite after another falls silent. Final telemetry suggests ultra-strong X-ray lasers; Kyle questions how the Russians could generate such powerful beams. Darlene shares his suspicions of F'thk meddling: Ambassador H'ffl has privately discussed a split in the Galactic Commonwealth between individualistic and authoritarian factions. H'ffl suspects an authoritarian agent hidden within his delegation. A civilization-ending nuclear war on Earth, should that happen, would at worst leave unchanged the familiar Galactic stalemate.

Kyle's colleague, fellow physicist HAMMOND MATTHEWS, proves the orbs are bugging devices, responsive to microwave pulses from space. Backtracking the beams researchers find radar-stealthed (but, as they re-radiate

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absorbed sunlight, obvious to infrared sensors) satellites. Missile launches from Earth cannot go unobserved; the stealthy satellites must have been put into orbit by the aliens. Russian spy satellites also begin to tumble—apparently dead, like their American counterparts. Britt accepts Kyle's deduction: aliens frying both nations' spysats, and aliens bugging—and whispering to—the leadership of both sides are behind the march to war.

A Russian heavy-lift Proton 2 missile carrying a replacement American gamma-ray observatory (shuttles still being grounded) explodes in flight—and telemetry reveals intense microwaves. Several stealthy satellites are seen firing masers at the same time. This must be how Atlantis *was destroyed: by microwave-induced boiling of its fuel.*

Plainly, Earth is at war. The question was why? *And did anything but squeamishness prevent the aliens with their vastly advanced technology from directly acting on their covert animosity?*

SWELK, a social-scientist passenger on the Krulchukor starship Consensus, *is congenitally lame in one of three limbs. With limbs and sensor stalks every 120 degrees, a normal Krul sees, hears, moves, and manipulates equally well in all directions. Krulirim have a radially symmetric worldview; a Krul locates objects by distance from her body and angle relative to her bearing on the nearest magnetic pole. Swelk's deformity makes her "sided," an orientation utterly foreign to her kind. In a species intolerant of birth defects, Swelk is an outcast.*

Swelk recalls how, on a long interstellar passage, she isolated unexpected radio signals, decoded them, and tracked them to an unknown intelligent species. The ship's captain, GRELBEN, was disinterested—every intelligent species known to the Krulirim had let its technology destroy them. To Swelk's surprise, fellow passenger RUALF convinced Grelben to detour. Upon reaching the humans' solar system, Swelk becomes more ostracized than ever—even as Rualf and his holofilm company become engrossed in something *from which she is excluded.*

Consensus *carries an alien menagerie destined for a homeworld zoo. Swelk offers to muck out the beasts' cages, correctly reasoning the crew won't enter the foul-smelling ship's hold to harass her. Abutting the hold is a lifeboat with radio gear . . . and to Swelk's confusion, Earth's airwaves mention* not *Krulirim, but a Galactic Commonwealth, and F'thk visitors, totally unknown to her.*

Rualf invites Swelk's sociological opinion of a recording on human international relations—a war council implausible to have been broadcast or shared with a Krul visitor. Her questions lead Rualf to an admission: film-company recording gear is in use. Rualf points out one such device in a scene's background. It is a "galactic" orb.

Pariah that she is, Swelk had stayed in her cabin when ferried from a planetary surface to the Consensus: *she has never seen its exterior. She downloads an image from the starship's library; the* Consensus *is the vessel so prominent in human broadcasts. Who, then, are the F'thk? A borrowed holofilm library reveals F'thk-like robots in one of Rualf's early movies.*

A hidden pocket computer and the shipboard wireless network let Swelk eavesdrop on the bridge. She overhears why Rualf and Capt. Grelben anticipate great wealth: the humans are unwittingly starring in a holofilm whose "special effect" centerpiece is Earth's nuclear immolation.

From "her" lifeboat, Swelk asks about the presidential advisor who quit to protest policy towards the F'thk: Kyle Gustafson. Her query is carelessly broad; the lifeboat computer accesses the main database of the Consensus,

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triggering an intrusion alarm.

Swelk flees, landing her lifeboat near Kyle's home. A lifeboat bioconverter (like the one that synthesized food for the shipboard menagerie) converts emergency rations into biomass modeled on a hastily severed digit. She leaves a sack of her genetic material, jammed into her ship's suit, in an acceleration couch, then sets the lifeboat aflame to cover her escape.

A sonic boom and the fiery descent of something *lure Kyle to the crash site, where something neither earthly nor F'thk accosts him. "Are you Gustafson?" demands a sack dragged by the alien. "It's only a movie," adds Swelk's translator.*

F'thk from a following lifeboat recover the apparent charred remains of the pilot, blaming an accidental launch during routine maintenance. Like so much about the F'thk, the explanation is implausible but not impossible—unless one knew the supposed victim was hiding nearby.

Swelk's debriefing suggests the mothership could be a hologram, projected from the moon and centered on an orbiting radar buoy. Kyle demonstrates a simpler holographic projection to Britt, who counters: what if Swelk is lying? A Galactic faction could *have faked her defection to trick America into attacking the landing boat.*

World tensions mount as distrust of the surreptitiously hostile aliens remains a secret closely held within the innermost circles of government. Cold War II has its first casualties in a Russian/American dogfight over the South China Sea.

Kyle's lab painstakingly constructs an image of the mothership from radar echoes. This image is a featureless sphere, quite unlike the telescopic view he believes is a hologram. Nearly convinced, Britt convenes a crisis team of trusted aides to leaders whose disappearance for lengthy consultations might alarm the Kremlin—or the aliens. Besides Britt (representing the president), Darlene (representing the secretary of state), and Kyle (representing the national labs), the team includes CIA deputy director ERIN FITZHUGH (representing the intelligence community) and USAF general RYAN BAUER (representing the secretary of defense).

War looms as Russian and American subs are lost at sea in a poorly understood incident. Kyle urges that the Russian president be told about Swelk—and the F'thk deception. The prevailing counter-argument: the apparent radar image could be a ruse, a falsified radar return intentionally masking detail to substantiate a fictitious defection. Unwilling themselves to attack the F'thk landing ship, they dare not risk encouraging the Russians to make such an assault.

Visiting his Minnesotan parents, Kyle meets ANDREW WHEATON, struggling farmer and part-time baggage handler at St. Cloud Regional airport. Wheaton's family vanished months earlier; the police suspect Wheaton but lack proof. Wheaton, who recognizes Kyle from media coverage, speaks of UFO rumors at the airport that night. They visit the field to which Wheaton claims to have been led from his empty farmhouse by soon-covered-in-snow footprints. Although the disappearance preceded the F'thk arrival by months, Wheaton blamed the aliens. Despite a feeling of déjà vu, *Kyle sees only a field.*

Swelk's safehouse, selected for its isolation, is a nineteenth-century farm house with few conveniences. Hasty preparations (mostly electromagnetic shielding lest Swelk's translator or bioconverter be bugged) had ruined some appliances; agents and guards live in an adjacent trailer. Darlene, ready to watch a holofilm projected from Swelk's pocket computer, exits the kitchen with fresh popcorn. She finds the Krul spasming on the floor. Swelk asks to watch the movie anyway.

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Kyle's déjà vu *in Wheaton's field had a cause: three soil patches too compressed to grow grass. An identical isosceles triangle marked the landing of the F'thk who had pursued Swelk. Like-weight objects had been on both sites: the weight of Swelk's wrecked lifeboat. Landings are confirmed at more UFO abduction sites: disappearances preceding the aliens' public arrival. Are abductees another reason the F'thk knew what buttons to push to urge mankind to nuclear war?*

Darlene, after a night at the safehouse, encounters Swelk recovering from another seizure.

Israeli jets bomb a suspected Iranian nuclear weapons lab. Russia's enabling tip-off raises American trust in the Kremlin. The timing is fortuitous: Kyle believes he can demonstrate the mothership's nonexistence—but his proof requires Russian cooperation.

Kyle and Sergei meet in the mission control center of an orbiting Russian X-ray observatory. Sergei has done his homework. Is the moon-circling mothership truly transparent to the X-rays emitted by distant colliding galaxies, Sergei speculates—or is there, in fact, no mothership at all?

The Russians and Americans hold a secret summit. Emboldened by Swelk's debriefing and the corroboration there is no mothership, President Chernykov urges an immediate attack on the F'thk vessel. Kyle and Sergei disagree: a starship capable of near-light speed must, as Swelk claims, carry quickly targeting anti-spacejunk lasers. Missiles arrayed against such defenses might prove useless. And many masersats like those that killed the Atlantis *still circle the Earth.*

Perhaps, muses President Robeson, they can just tell the aliens to leave. Why stay if Earth denied them their special effects? Kyle's rebuttal: an undestroyed Earth could give (starting with videos of the starship) damning evidence to future visitors. Might stymied aliens leave behind a doomsday device?

The summiteers are left with a desperate plan: a commando raid to capture the alien vessel.

Part Three

CHAPTER 25

"I think I misjudged you." Ryan Bauer, a water tumbler full of ice and amber liquid in his hand, flung himself into the captain's chair across from Kyle. "In a fingernails-across-the-blackboard sort of way, you're all right."

The borrowed private jet, most specifically *not* designated Air Force One, was plushly carpeted and richly appointed. There were no flight attendants aboard, in the interests of the trip's secrecy, but the Cessna's pantry came stocked for major partying. With the summit over, and serious attack-planning impossible until they got home, the passengers were taking advantage. "You'll turn my head, General. Or is it the bourbon speaking?"

"Scotch." Ice cubes tinkled as Bauer downed a healthy swig. "But in a good cause."

"Okay." Kyle had no idea where this was going.

"You're all right," the flyer repeated. "You have a good head on your shoulders and an insane willingness to speak your mind."

"So what good cause does the Scotch support?"

"My willingness to step onto a plane." Laughing, he nabbed a jumbo shrimp from Kyle's plate. "Not what you expected, was it."

"Most pilots actually like airplanes."

"It's not that." Bauer leaned forward conspiratorially. "You understand these things. I'll gladly fly after the Tea Party."

Tea Party was the code name for the as-yet unscheduled assault on the starship. What Kyle failed to grasp was what he supposedly understood. "Excuse

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me?"

"Beam weapons." Bauer expropriated another shrimp. "The lasers on the moon use visible-light frequencies, so that we can see the hologram. They took out the *Atlantis* and that Proton with microwave frequencies. The early-warning birds are being fried with X-rays. Why X-rays, do you suppose?"

"Because the atmosphere blocks X-rays. If the aliens had used microwaves, like they did with the *Atlantis*, we and the Russians would have had a better chance to see what was really going on, instead of automatically blaming each other for the saticide. Some of those downward-stabbing microwaves could have been detected on the ground. We don't have beam weapons in space, and neither do the Russians . . . as far as we know, anyway."

"Saticide. I like that. Hafta suggest it to someone at the Pentagon." Bauer admired the spectacular alpine scenery rushing by far below. "Swelk's ugly friends have lasers that are far too tunable for my liking. Now, whenever I'm flying, I feel like a sitting duck."

Tunable lasers. Microwave beams tuned to an excitation energy for liquid hydrogen had exploded the fuel tank of the *Atlantis*. X-rays from the same alien satellites continued to destroy Earth's satellites. The leisurely pace at which Earth's satellites were targeted had been a mystery. Since Swelk's defection, Kyle had come to believe it was plot-related. Film plot, that was. Rualf, no friend of Swelk's, presumably wanted his bugs to capture plenty of suspenseful scenes in the build-up to Armageddon.

"Kyle, buddy. Are you with me?"

Tunable lasers. How separated were the excitation frequencies of liquid hydrogen and jet fuel? They were surely much closer together than microwaves and X-rays. "Sadly, Ryan, I *am* with you . . . but maybe you're not worried enough. Why limit your misgivings to attacks on the jet fuel in planes? What about petroleum pipelines? Natural-gas storage tanks? Hell, what about ordinary everyday gasoline?"

"Yeah, you're all right." Bauer downed another healthy swig of Scotch. "Planning for Tea Party just got a whole bunch more complicated."

"How so?"

"Because," said Bauer, "you may be right. We and the Russians had better plan to attack all the alien satellites at the same time commandos storm the ship on the ground."

The F'thk ambassador trotted briskly up the ramp into the gaping airlock. As was his custom, H'ffl was the last of the delegation to come aboard. He stood in the airlock, gazing serenely over six hundred thousand smiling Pakistanis, until the outer door thumped shut.

Ridiculous two-sided creatures.

"Helmet, clear. Unit, off." The effect of Rualf's first command was to give him a view of the cargo bay. The robot through whose cameras he had been seeing remained in the airlock. His second command put the robot itself into its idle mode. Stiff from spending much of an Earth day inside the teleoperations gear, he cautiously disengaged his limbs from its delicate controls. With a squeal of delight, he freed his sensor stalks from the restrictive helmet. All around him, members of the troupe were extracting themselves from their own equipment. They all moved like Rualf felt: clumsy and stiff from long confinement.

It was night shift by ship's time, and he strode grandly through the mostly empty corridors to the officers' mess. Control of a F'thk required precise motions of the digits; flexing and stretching and moving boldly felt wonderful.

His mood was far from the euphoria the strutting suggested. The humans, in a display of sly animal cunning, continued in their stubborn refusal to destroy themselves. The Pakistani junta, the true subjects of this visit, were not progressing towards an attack on India with

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nearly the speed Rualf would have liked. At least the generals had rounded up a good crowd of extras.

How long until the captain's still good-natured rumblings of impatience turned serious? How long until the captain insisted on a return to civilization? Or could Grelben, his ship heavily mortgaged even before the interstellar detour, afford to go home without his cut of this film?

"No rest for the wicked," he announced to no one in particular. It was an Earth expression learned from one of the first freaks they had abducted The expression amused Rualf greatly. The freak, of course, was long beyond amusement. He changed direction on impulse, deferring his snack to go instead to the bridge.

"How was . . . Islamabad?" asked Grelben. The question was a courtesy; his attention was mostly on a maintenance console.

"Fine, Captain. Very interesting." Rualf reared onto twos to thoughtfully flex the digits of his third extremity. "Could I have a word with you in private?"

"Take over," Grelben told a junior officer. "I want a report by shift's end on the status of the environmental system. To Rualf he added, "Come to my cabin."

They walked in silence to the captain's quarters. Inside, Rualf admired the hologram of a Salt Sea shorescape. "Beautiful scenery. I understand why you want to acquire property there."

"Which implies completion of our little project here. I hope what you want to discuss is the imminent completion of our undertaking."

Rualf tipped toward the captain in an insincere show of respect. "I've been thinking about that happy day. With their many shortcomings, the humans could fail to do a proper job of self-destruction. I can envision a situation where we have all the recordings needed for a three-square of movies—but a few survivors still retain some technology."

Grelben trained two sensor stalks on him. Inside the small cabin, such direct scrutiny was a frank, almost rude, stare. "Are you saying your plan is not working?"

"Of course not." If it *were* true, he would not say that. "We set out to capture scenes that we could not invent, and we have those. I could make terrific films now."

The staring eyes narrowed shrewdly. "I remember bold promises of nuclear destruction. Special effects that you have yet to produce."

"I will." Rualf was confident the F'thk could goad *some* humans into a nuclear exchange, which would suffice for the movie. That said, only the Russians and Americans had the capacity to do truly global damage. For reasons that remained unclear, and despite his best efforts, the Russian freaks and the American freaks kept recoiling from full-scale warfare.

The worry gnawing at Rualf's gut was devastatingly simple. What if Swelk had been correct about the humans' potential?

The *Consensus* could not leave behind an unobliterated Earth. Krulirim were long-lived, especially those who, like his troupe, did much relativistic traveling. Until the destruction of the space shuttle and the subsequent abandonment of their space station, the Earthlings had been, if just barely, spacefaring. How long, if they did not destroy themselves, before they became starfaring?

His kind had freely pillaged the worlds of the primitive species they came across—but the savages were never overtly harmed. An encounter between humans and another Krulchukor ship or a Krul-settled world could be disastrous.

There had to be a plan to destroy Earth if the freaks refused to follow his script.

"So why did you want to see me?" Grelben had stopped staring, if only

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long enough to pour himself a drink.

"It occurred to me we have an option. We are closest to success with countries having smaller stockpiles of nuclear weapons. Hostilities between two such countries will give us almost everything we could hope for. We may want to consider leaving once that kind of war happens. It could get us home sooner." Time to see what the captain was made of. "But it would require us to do a little clean-up."

Grelben stoppered his flask. His penetrating gaze returned to Rualf. "Some fumigation?"

Great minds, it appeared, thought alike. "That's right."

"I like to clean up after myself." The captain waggled his sensor stalks in amused satisfaction. "I happen to have given some thought to how it could be accomplished."

The strip-mall restaurant boasted, using the verb loosely, an eclectic mix of Chinese wall hangings, a bar filled with brass fixtures and potted ferns, and art-deco furniture. It was shortly after six o'clock on a Saturday evening, and not quite half the tables were occupied. The Hunan Tiger evidently wasn't the first eatery to occupy this location. It was unlikely to be the last.

Amid the ebb and flow of diners' conversations, Kyle had an epiphany: I need to get out more. Two men in a nearby booth looked away in embarrassment as he caught them eyeing him. He shrugged and smiled—his fifteen minutes of fame again. Or they were staring at Darlene, which would have combined bad manners with good taste.

"We won't be talking much shop tonight." Darlene had been scarfing down rice noodles; she pushed away the half-empty bowl. "What were you thinking, suggesting this place?"

"That it would be nice not to talk shop for a change." And that this was the calm before the storm. He refilled their tea cups, awaiting her response.

A brief smile chased away an even shorter flash of surprise. "Yes, I'd like that."

"So what's your story?"

"More a vignette than a story. I'm from Iowa. Mom taught French in high school; Dad, German." She quit talking as the waiter delivered their egg rolls, and didn't resume when he left.

Ah, a fellow Midwesterner *and* an only-in-the-workplace extrovert. No wonder he could relate. "Therefore you became a diplomat to prevent another European war?"

She had a nice laugh. "I'm told the French were the aggressors in this case."

"Go on."

"In my own understated way, I rebelled—I studied Spanish. That led me to Latin American history. I don't have the patience to teach, so here I am."

He spooned duck sauce onto his egg-roll. "If you don't have patience, why doesn't working in government make you *crazy*?" He canted his head thoughtfully. "Or has it?"

She'd just begun a snappy comeback when his cell phone chimed. *Very* few people knew this number. "Hold that retort."

If the summons wasn't unexpected, its timing was. He waved over their sullen waiter. "Please cancel the rest of our order." To Darlene, he explained as much as he could in public. "We have to get back to town."

"We're not ready." Ryan Bauer's tone carried conviction. "Most of North America is covered, in theory. The Russians tell me the same about central and eastern Europe. Hawaii and most of Russia east of the Urals are still hanging out there. And last I heard, a few people live in Africa, Latin America, most of the European Union, China, and India."

The crisis team had reconvened at Britt's urgent summons. Wind rattled the cabin windows; the sky was forebodingly gray. Today's agenda had only one topic: how soon could the *Consen-*

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sus be assaulted? Britt didn't like the answer he was getting. Or rather the nonanswer. "Ryan, that's irrelevant. I asked about the starship."

"Britt, you've seen Kyle's study. Their weapons satellites can kill an airliner within a minute. We know they routinely scan our cities with low-power beams. That's how they do a readout of the infernal orbs. A frequency tweak and a squooch more power, and the same scans will explode cars instead. What would that do to, say, London or Rio or Tokyo?" Ryan thumped the table. "Our strategic defense labs are all incountry, not surprisingly. Same with the Russians. Those labs are where the experimental beam weapons are. To have a prayer of protecting anyone else, we need to deploy, and in secret, to other spots around the world."

A Franklin Ridge study sat in front of Kyle. His lab had done its usual beyond-thorough job. Bauer, if anything, was downplaying the potential disaster. Urban sprawl routinely engulfed once-isolated refineries and natural gas tanks. And natural gas had become the fuel of choice for small, city-sited electric power plants. These new plants were everywhere, run by factories and electric utilities alike. Estimated casualties of a microwave strike from enemy satellites: tens of thousands per city, almost instantaneously.

"I said, how soon, General?" Britt's voice was icy.

"Britt. Since we've started down the path of reviewing our vulnerabilities to the satellites, it'd help me, at least, to finish that." Darlene had read the study, too. Erin Fitzhugh nodded her concurrence.

"Five minutes," begrudged Britt, bending only slightly to the unusual display of unanimity. Bad news as yet unshared peeked out from his eyes. "Then I expect a number, Ryan. And it better be measured in days."

"Five minutes," Bauer agreed. "Very discreetly, I've had the best analysts at BMDO"—the Ballistic Missile Defense Organization—"look into this. Keeping the enemy satellites from doing who knows what means engaging them the moment we reveal ourselves."

"Engage them how?"

"Any way we can, Britt. We have experimental ground-based ABM and ASAT, antiballistic missile and antisatellite, laser weapons. So do the Russians. Those can engage enemy satellites that are reasonably close to overhead. We have some mothballed air-launched ASAT missiles, launched from F-15s. Those can be deployed overseas, but that will take a little time. The Russians have tested a space-mine system. That basically put bombs into orbit, bombs that are exploded when their orbits approach a target. And we can improvise weapons, fitting ballistic missiles with infrared sensors. The ET targets are stealthed, but they can't help radiating excess heat that we can see."

A thunderclap shook the cabin. Seconds later, a sloppy mix of rain and sleet began pelting the roof and walls. Britt stared downhill at the wind-whipped bay. "I remember Sergei's glider analogy. Can ASAT missiles accomplish anything, or are they more for our consciences? I won't delay for symbolism."

"Oh we'll accomplish something. I guarantee it." Bauer shook his head sadly. "We'll draw their fire. If we're really lucky, the commandos will penetrate the starship and get the aliens to call off the satellites, before they've done real damage to civilian targets."

Megadeaths were riding on one roll of the dice. Kyle took a deep breath. "Britt, the Russians agree with the plan of deploying rudimentary civil defense before the raid. You *know* that. What's going on?"

"You have to specify your Russians. President Chernykov, yes. Your friend Sergei, yes. The ultra-nationalists, no." Britt turned away from the window and the storm. "The Russian ambassador brought a dispatch to the White House

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this morning. It's about yesterday's gang-land shoot-out in Moscow."

The story had merited two paragraphs in the morning's *Washington Post*: cops and robbers and a warehouse fire. "I don't get it," Kyle said.

When had Britt ceased looking distinguished and begun looking *old?* "It had nothing to do with the Russian Mafia. The nationalists learned Chernykov's government leaked the site of the Iranian nuclear-weapons depot. They were furious at the betrayal of a long-time Russian ally.

"Bottom line, there was a coup in the works. The fire was to cover up the real story—a botched raid by the Interior Ministry police. Chernykov thinks he can suppress the story for maybe a week. He hasn't trusted the nationalists' judgment enough to bring them in on the real aliens situation." He raised an interrogatory eyebrow at Erin Fitzhugh.

"The Agency doesn't trust them either," she answered. Britt's news was apparently not a surprise to her. "Russia's sacred destiny, restore the glorious empire of the golden communist era, yada yada yada. I wouldn't trust the nationalists with Swiss army knives, let alone nukes. Problem is, the military and internal-security forces are riddled with sympathizers."

"Thanks, Erin," said Britt. "Dmitri was advising the president, in an act of incredible statesmanship, that he may not be able to retain power much longer, at least not without entrusting the nationalists with the truth about the aliens. Possibly as little as two weeks.

"The *Consensus* is scheduled to visit Washington in six days. That's how long, General, you have to get prepared."

Kabuki theater, ballet, and medieval passion plays.

Darlene sank with a sigh of quiet contentment into her favorite chair. A cup of tea sat beside her on the end table. She hadn't been in her own house much these past few months. Only rotten weather and the twilight finish of today's crisis meeting on the Bay had brought her home tonight, instead of driving another two hours to the safe-house.

Indian Deva Dasi temple dancers and Chinese shadow-puppet theater.

Diplomats spent hours politely observing the traditional dramatic arts of other countries. At the start of her career, that had included countless—and endless—zarzuelas, the Spanish variation on opera. Sadly, understanding the dialogue and lyrics made opera even more artificial.

Aboriginal storytellers banging clapsticks and drums.

At the zap of a remote, the gas log in the fireplace lit with a whoosh. The flames appeared twice—directly, behind the fireplace's tempered glass doors, and again reflected from her big-screen TV. The television was off . . . she'd had it up to *here* with visual entertainment.

Her long-last-at-home serenity was evaporating. Guess who wasn't in the defense/spy circle? Guess who wasn't Britt's protégé? Now take a wild guess who was tasked to watch movies?

Despite years of on-the-job desensitization and her initial enthusiasm, the Krulchukor films were grinding her down. Earth's covert resistance had *so* few members—how had she wound up in such a meaningless and unproductive role? This was like too many overseas assignments, when she'd been the sacrificial diplomat nodding through some lavish cultural extravaganza the ambassador had refused to attend.

She tucked herself into an afghan. How many movies had she watched so far with Swelk? Six, she thought, but they all blurred together. Swelk had started her with "The Reluctant Neighbor." Pausing the holographic film every few minutes to ask questions, re- and re-re-watching scenes to catch stuff she realized she'd missed, training herself to recognize alien cinematic conventions

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. . . that first movie had stretched itself out over twelve hours. Kyle had asked her to describe it, and the best she could come up with was: Victorian comedy of manners meets film noir. Then came "Circle of Friends," ten and a half hours, and "Strength in Numbers," ten. The movies weren't getting shorter, but she was acquiring some facility at reading a Krul's body language. The new skill reinforced a conviction that Swelk was telling them the truth.

So? If she accepted the concept of a world-threatening hostile theater company, it wasn't much of a stretch to believe that the one Krul she had met could act.

Darlene eyed the heap of mail a neighbor had been regularly bringing inside. She couldn't bring herself to look at it. What came next? Oh, yes: "Revenge of the Subconscious." She'd had high hopes for that; it contained, Swelk had advised, the dream sequence based on extinct Krulchukor monsters. Even a human could see the resemblance to the once enigmatic F'thk. Darlene had once more found herself believing the little ET.

And again that movie was a predictable morality play. Conformity is good; individuality is an aberration. Fit in, get along, understand the other Krul. Empathy, empathy, empathy.

Darlene found herself on her feet, hunting for a snack. Her milk was two weeks past its expiration and lumpy; she returned the cereal to the pantry and heated canned soup. The movies were rich with nuanced relationships and subtle societal cues, replete with hints of cultural structure she was only beginning to notice. They were invaluable as social commentary, but it was *so* hard, when viewing them so intensively, to get past the boringly consistent moral.

"Going Home" had made Swelk cry—at least weeping was how Darlene understood the collapse of Swelk's sensor stalks into overcooked-pasta flaccidity. The title alone, given Swelk's situation, was enough to make Darlene's eyes mist. The ET had no expectations of ever seeing home again. Dammit, she *liked* Swelk, but her job did not allow her to trust the alien.

Darlene returned to the den and its cheerful fire. She couldn't even remember the name of one movie. She had to tell herself she did good for the cause at the team meetings—she couldn't see what she accomplished as a film critic. Or did she even delude herself that she contributed in the group? She hadn't been brought to the big meeting with the Russians.

Flickering flames, familiar surroundings, comfort food . . . she plopped back into her arm chair. Cultural force-feeding notwithstanding, she really did know her immersion in Krulchukor social structures and conventions was invaluable. It had to be, didn't it?

Think, woman.

She found a memory instead of a thought: Kyle dismissing her plot summaries as "Chick flix on steroids." Real helpful.

Or was it?

"It's only a movie." Those were among Swelk's first words to Kyle. Only a *Krulchukor* movie. A movie directed by Rualf, as were, supposedly, all the films Darlene had been lamenting. What sense did the coming apocalypse make as a Rualf film?

More, even, than "Revenge of the Subconscious," the film in which humanity was unwillingly starring would have spectacular visual effects. Wide distribution of Galactic orbs finally made sense—no self-respecting Krulchukor movie could get by on explosions. It needed pathos. Heads of state and *their* orbs would be vaporized when the missiles hit . . . but the troupe could continue scanning orbs in the countryside. Plenty of poignancy and social interest as chaos and fallout spread.

It was a stunning insight. Shivering, Darlene reclaimed the afghan earlier cast aside. She *knew* there was some-

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thing else here, some other implication waiting to be recognized.

When it finally came to her, she actually clapped her hands in glee.

Britt was the product of old money and a multi-generational tradition of public service. His mother was a past national-society president of the DAR. A deep social chasm separated the landmark Arledge mansion from Darlene's humble home.

When enlightenment struck, well past midnight, she didn't hesitate to drive over. Time truly was of the essence.

"It's all right, Bill," Britt told the Secret Service agent who answered her knock. Instead of the silk pajamas and velvet smoking jacket she'd envisioned, her host wore a plaid flannel shirt over cargo pants. She must have looked surprised. "And I put them on one leg at a time."

He led her into a sitting room, then cut short her nervous visual search. "No orbs in the house. No gadgets in this room that could possibly be tapped. Daily bug searches. What can I get you to drink?"

"Nothing, thanks." Darlene was glad he had a fire going. His burnt real logs. She stood by the hearth, arms outstretched to warm her hands. "You know that tea party we're planning for a few days from now?

"I think I know an easier way for the partygoers to get in."

CHAPTER 26

Rualf rapped confidently at the cabin door behind which, he had good reason to suspect, the captain was asleep. One extremity of his raised limb held an ornately carved flask; a second extremity clasped matching goblets.

"What is it?" Grelben's voice was groggy and abrupt, as if to disprove the cinematic convention that all ships' captains woke instantly.

"I have good news, Captain." Excellent news. Long-awaited news. "And some vintage k'vath to toast it."

The door swung open. Grelben's posture of annoyance vanished as he noticed the near-legendary label on the bottle. "Come in."

"It has been a long road." Rualf carefully decanted two servings of the foaming green elixir. "Here is to the next road. To the road home, and wealth at our journey's end."

One eye widened in curious suspicion. "You seem to be leaving out a few details."

"May I use your computer?" Receiving a grunt of assent, Rualf continued. "Intercepts file for the American president. Conversation tagged 'almost there.' "

The hologram that leapt into being featured two familiar humans. The office where they met was, as if a parody of Krulchukor perfection, oval in shape. "The president and his chief advisor. Watch."

"This must be held in absolute confidence, Britt," said the president. He sat behind a massive desk, his image clearly captured by an orb. A scrolling ring of text interpreted the facial expression and stance as denoting extreme levels of tension and weariness. Swelk's artificially intelligent translation program continued to learn. "There's something I need done that requires the utmost discretion. You'll get lots of opposition, but I trust you to make it happen anyway."

"Of course, Mr. President."

The president waved one of his freakish upper limbs. The translator called the gesticulation dismissive. "It's just us, Britt, and we've no time for formality."

"Fine, Harold. What is this about?" Curiosity and worry, speculated the text caption.

"Art and history. It's about culture. It's about preserving our heritage."

"I have to say, Harold, this is rather mysterious."

"Watch," interjected Rualf. "I could not have scripted this moment in a million years."

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The president swiveled his chair to look out the window behind his desk. The orb lost its direct view—but the leader's strong profile and haunted expression were captured perfectly in reflection on the glass. Behind and through that image could be seen a towering stone obelisk. Robeson's reflected chin trembled. "In a matter of days it all ends, Britt. The somewhat-sane Russians are losing control. The lunatics who are taking over will hit us with everything. We'll defend ourselves. Between us, we'll reduce it all to so much radioactive rubble.

"There must be something left to remember us by. Something to teach the survivors—if nuclear winter doesn't kill everyone—that once we were great."

"Visually, that is just perfect." Rualf pointed into the hologram. "That tall monument, whatever it is. It reaches to the sky like a satiric symbol of the potential these poor ill-fated creatures did not live to fulfill." He savored his use of the past tense, considering the humans' doom already determined.

The presidential aide had recoiled in shock, settled heavily into a chair, then recovered his wits. "What do you want me to do? What *can* I do?"

"Gather—very discreetly—some of our national treasures: art, archives, artifacts. Have it taken for safekeeping somewhere unlikely to be bombed." The president spun back towards his confidant. The interpretive subtitle announced: great sadness. "But on the remote chance I'm too pessimistic, you *must* do this behind the scenes. Worse than the panic publicity would cause is the probable interpretation by the Russians. They could misinterpret that we were evacuating our cities in preparation for our own first strike. I don't want to goad them into launching."

Britt rocked in his chair. "There are always museum exhibits on tour between cities; some of those should be easy to waylay. And I've read that much of any museum's collection is not on display, but warehoused or in labs for study. It should be possible to quietly pack up and move some non-public parts of collections."

"That sounds excellent." The president's lips briefly curved upward. The translator advised: feigned good cheer. "Maybe a few of the most precious items on permanent exhibit, like the Constitution and the Declaration of Independence, can be withdrawn under pretense of doing some restorative work."

"I'll do what I can, Harold."

"I depend on it, Britt."

"Freeze," commanded Rualf. "This is what was missing." To Grelben's puzzled gaze, he added, "It was going to be a good film—but not artistic. Not *important*. Our audience had no reason yet to really care about the humans. But *this* . . . this striving against all odds for immortality. How can the audience not *love* that?"

Grelben grunted. "I leave such matters to you."

As you should. Keeping his self-approval to himself, Rualf struck a dramatic pose. "You know what would be even better?"

"What?"

"An ironic success. Imagine the F'thk rescuing a few human trinkets. I see the humans, as they die, taking comfort that some of their artifacts have been removed from Earth to preserve their memory." Rualf was overcome with the majesty of his artistic vision. "I *love* it."

In a tumultuous scene, the Krul heroine overcame her aspirations of personal fame. Her family embraced her. Credits rolled. Music swelled. At least Swelk called it music . . . the repertoire of the Krul's translation software did not extend to cross-species harmonic substitutions. Darlene's private description for the film's audio accompaniment was the enthusiastic stirring of a large bag of broken glass. The soprano counterpoint suggested that the mixing was performed with the bare limb of the

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musician.

Despite the predictability and aural assault, Darlene could not help but smile. In a flash of synergy, or serendipity, or gestalt, or epiphany, or . . . her insight was multi-cultural and by rights ought to be known by a hundred names. Earth had been plunged into danger to produce a film—and the filmmaker's artistic sensibilities would prove to be his undoing and Earth's salvation. There was a symmetry here that she couldn't get over. God bless these awful movies.

It would have been perfect to share her discovery with Kyle, but he was off helping strategize the upcoming attack on the maser satellites. It felt *so* good to know she was truly contributing. She could even watch the alien movies now without wincing.

As if reading Darlene's mind, Swelk asked, "What did you think of that show?"

"I enjoyed it," Darlene lied tactfully. Now could she unobtrusively redirect the discussion? She thought she saw an opening by which Swelk could validate her thinking. She wasn't after a sanity check so much as a fine-tuning. "I was taken with the emotional wealth of the final scene. It seems like Rualf likes to end all his films with an intense personal climax like that." Did the translator handle tones of voice? Darlene didn't know, but just in case, she made an extra effort to sound casual. "Am I correct in remembering that we're watching a complete collection of his works?"

"So I was told." Blackie and Stripes dependably fled the vicinity of Krulchukor music. Now that the film was over, the kittens were back. Swelk, sunk deep into a beanbag chair, now devoted an entire limb to each pet. Each kitten was on its back, stomach bared, purring loudly at the massaging of nine digits. "Rualf, unlike his heroine, continues to appreciate attention. I would be very surprised if he omitted any of his films. At the least, these must be the movies of which he is most satisfied. Why?"

"It occurred to me to wonder about the movie Rualf is now making. Worldwide ruin and destruction don't seem to give Rualf the type of ending he always goes for." Darlene strove for nonchalance. "I'm no expert on Krulchukor cinema, but it seems the new film is,"—what term had she used with Britt? Oh yes—"dramatically deficient. It lacks personal realization."

"I see." The atonality of the translation implied anything but understanding.

"Here's a crazy thought." Hopefully *not*. Hopefully this thought was entirely sane. At Darlene's urging, Earth's one shot at surprising the aliens relied on this idea. She forced a casual laugh. "I don't know why I'm even thinking about this. It's not like Earth's interests lie in the structure of Rualf's film. I'm just reacting to watching so many of his past projects.

"Wouldn't the movie be more consistent with Rualf's approach if humans did something altruistic before the end? If, before they perished, they made some noble gesture? If they acted—of course, tragically too late—for the betterment of all?"

"It would indeed. That finale would almost certainly appeal to Rualf. But the artistry of the film is hardly Earth's biggest concern." Swelk paused in her ministering to the kittens. "Or am I wrong? Have circumstances become so dire that *you* seek immortality in a great film?

"Hardly," said Darlene. She was feeling pretty smug at the confirmation the little Krul had provided. "My fondest hope is that Rualf never finishes his film."

The secretary backed silently from the Oval Office, leaving a grim president alone with his visitor. Behind that visitor, a galactic orb high on a bookshelf saw all. "Welcome, Ambassador H'ffl. I appreciate you coming on such short notice."

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Rualf peered out through the camera lenses of the F'thk robot. "Please, Mr. President, have a seat. I prefer to stand, but there is no reason for you to." A standing robot did not tire, and it had an excellent filming angle. He did not continue until the human retreated to the chair behind his desk. "Now what is this matter of great sensitivity mentioned in the radio message?"

Enigmatic muscular twitches played across the human's face. ("Unhappy and worried," interpreted a text window in Rualf's helmet). "This is a hard matter of which to speak."

"Pardon me, Mr. President, but the tensions between America and Russia seem to be escalating. Human politics are not my field of expertise, but to an outsider the situation looks unpromising. I fear this is not the time for delay. If I can be of service, I hope you will speak plainly." Orbs and intercepted communications showed preparations for war increasing *so* rapidly, finally, that the H'ffl robot had been delivered in a lifeboat. Rualf had been unwilling to delay meeting with the president until the next scheduled visit to Washington of the *Consensus*.

The president's face contorted ("grieving," read the interpretation). "Things aren't very promising to an insider, either." He opened his mouth as if to say more, then closed it. The sad expression continued.

Did *no* human ever make things easy? Rualf would have thought the appropriate course of action obvious. Clearly he had been on this awful world too long, if he seriously expected reason from the natives. "I apologize in advance for the suggestion I am about to make. My words will seem to imply a lack of confidence, when perhaps all will work out for the best." The robot tipped its head in mimicry of a human gesture of confidentiality. "What I am considering skirts the limits of my authority." He paused again, hoping the human would make the conceptual leap. The scene would be more dramatic if the human made the proposal—whatever hints Rualf made to get there could be edited out.

"No need to apologize. Some new thinking is very much needed." The president briefly squeezed his eyes shut ("struggling for the proper words"). "Can your people stop our madness? We seem powerless to stop ourselves."

"How? By threatening harm to you or your adversaries? Coercion would not only be wrong, and against everything for which the Galactic Commonwealth stands, but surely also futile. Why would our threat be more of a deterrent than your own evident plans to harm each other?" Rualf zoomed in as the robot spoke, capturing a tight close-up of the president's face. The human leader closed his eyes again in thought and sorrow.

A moment later, those eyes snapped open amid an interplay of facial muscles Rualf could not understand. ("He has reached some decision?" guessed the caption.) "Mr. Ambassador, I believe you *can* help. Help us in the event of the worst. We could destroy ourselves, destroy our world. If that happens, I would die happier knowing that a small part of what we accomplished will be remembered."

Thank you! These humans at least had *some* sense. "You have much of which to be proud. I can promise you that even if the worst does happen your story will be remembered." Now, you slow-witted bilat freak, *actually make the offer*.

"That is good news." ("Increased decisiveness.") There was a dramatic pause—too long a pause, but that would be tweaked in editing. "I want to go a bit further. I would like to send with you a sample of our achievements. Pieces of our art, selections of our finest thought."

Success! Rualf made the robot nod its head in human-like agreement. "I understand. A sad plan, but perhaps a prudent one. Yes, I would be willing to do this." Playing to the orb he had the robot add,

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"All will be enthusiastically returned if we are, happily, too pessimistic."

"I wish this fine old house could be saved, or the great monuments of this wonderful city. They can't. Most of our finest treasures are impossible to save." President Robeson studied the room as he spoke, as if trying to memorize it. He straightened in his chair in resolve. "Anything too visible cannot be taken without being noticed. Notice would bring panic. Panic would be misinterpreted by the Russians as a pre-attack evacuation. I will do my duty to defend and avenge America. I will *not* trigger her obliteration."

Rualf somehow contained his glee for long enough to complete the transaction. A landing by the *Consensus* could hardly be disguised, and the president insisted there be no big deviation from past routine that could raise Russian suspicions, but still some unique arrangements were necessary. The trusted aide whom the orb had seen assigned to gather America's treasures was now brought in to coordinate the details of a circumspect transfer. This Britt person thankfully had a mind for details—what he now proposed was workable.

The coming scene took shape in Rualf's mind as plans were finalized, and it was a thing of poignant beauty.

Andrew Wheaton chewed on an unlit cigar, debating whether he was going to do this. The scrap of paper in his hand had the unlisted cell-phone number of Kyle Gustafson, information wheedled from the scientist's mother. The Gustafsons, who had welcomed Andrew to their Thanksgiving dinner with open arms, were the salt of the Earth. Andrew was a lot less certain what he thought of their son.

Dirty dishes filled the sink. Crumbs and stains covered the table in front of him. Tina would have been disappointed—she kept the little farmhouse spotless. He choked back a sob. If Tina was here he would not be thinking about this call.

Would Kyle talk with him? The man had been nice, at least. But the cops had been nice too, at first. Then they had laughed behind their hands at the UFO nut. Then they had as much as accused him of killing his own wife, his own son.

Was Kyle Gustafson any different? Andrew had dared to hope so. After he'd shown Kyle the field, people had come to the farm. They took samples from the pasture, did a survey. But then . . . nothing.

Kyle had left a business card with a phone number—but he never answered the phone. Sometimes an assistant, a young-sounding man, picked up. He took messages, even returned calls. The young man was polite, but he knew nothing. "Kyle will call back when he can."

What did he expect, anyway? Tina used to tease Andrew for buying tabloids. The "big" newspapers didn't understand about aliens, only the tabloids did. A tear ran down his cheek. Did Tina understand now? His gut told him that she was gone.

Was there anything he could do? He had thought and thought—and there was something. But that something made sense only if he had abandoned hope. He looked again at the scrap of paper in his hand. At his last hope. He dialed.

"Hello?"

"Dr. Gustafson, this is Andrew Wheaton."

"Hi, Andrew. I didn't know you had this number."

Didn't want me to have it. "I told your mom I had to reach you." When no comment came, Andrew continued. "I need to know what your people found."

"Andrew." There was anguish in the voice. "There's nothing I can tell you. I'm sorry."

His guts felt like someone had reached in and squeezed them. "Nothing to tell? Or nothing you want to tell?"

"I'm sorry," Gustafson repeated. "Sin-

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cerely. Andrew, I have to go."

Tina had sewn the blue gingham curtains over the kitchen window. She'd cross-stitched the samplers decorating every wall. Andrew Junior had colored the crayon drawings pinned to the corkboard and magneted over most of the refrigerator door. "I'm sorry, too," he whispered.

The alien devils . . . soon *they* would be sorry. He would see to it.

CHAPTER 27

The coaster clung to Kyle's glass of ice water, suspended by a film of condensation. Then gravity had its way; the coaster fell to the floor.

Drink coasters were a concept with which Swelk was unfamiliar. The unexpected noise made her drop her glass. It shattered. She shuffled in confusion.

"My fault. I'll take care of that." Kyle started picking the largest shards from the puddle, pausing to shoo away the kittens, who had come to investigate. They were in the safehouse's dining room, Swelk's favorite room. If he had to guess, based on his woefully inadequate grasp of Krulchukor psychology, that was because of the large oval table. It was one of the few curved pieces of furniture in the house.

Darlene, who'd been about to leave after her own visit, stuck her head in the door. "Blot that with a towel. I'll be right back." She returned pushing a vacuum cleaner, its power card trailing behind her into the front hall. She flicked on the handle-mounted switch.

Swelk collapsed, her legs convulsing. Her sensor stalks went rigid.

Kyle lunged for the cord and yanked. As the plug whipped into the room, Swelk's seizure was already fading. Her squeals of protest were untranslatable. "Swelk, what can we do?"

Darlene dropped the vacuum's handle. "Not again."

"Again!" snapped Kyle. His eyes remained on the twitching alien. "What the hell does *again* mean? You've seen this before?"

"Seen, no. Well, sort of. Twice I've been in another room when Swelk had some type of twitching episode. I was never right there when it happened, and I saw *nothing* like this. The first time, a pair of agents saw her right after, too." Her brow furrowed in recollection. "Swelk made it sound like vertigo. I know she's mentioned waking up dizzy."

"I . . . I am . . . am fine," the translator stuttered. The alien climbed back to her feet and walked shakily to the nearest beanbag chair. She dropped heavily, rustling the plastic peanuts inside. "That was horrible . . . whatever . . . it was."

She had dropped like a stone when the vacuum cleaner started. The kittens had bolted at the same time. Was it the unexpected racket? "Swelk, it's important that we isolate the problem. If you agree, I'd like to turn this,"—he pointed at the vacuum cleaner—"on for a moment. We need to see if the symptoms return."

Swelk clasped her extremities, all the digits interlaced. From within the hollow of the beanbag chair, she said, "At least I cannot fall from here."

He plugged the vacuum cleaner back in. The switch was still on; the motor restarted with a roar. Swelk's limbs spasmed. He pulled the plug, and the fit began immediately to subside. "I guess we won't be doing much vacuuming."

Darlene impaled him on a dirty look. "What can we do for you?" she asked Swelk.

What was going on? "Swelk, what were you doing when the earlier episodes struck? What was happening around you?"

"Maybe some water, Darlene." The ET's sensor stalks bobbed. "In an unbreakable container, if there is one." She chugged most of a glassful before answering Kyle. "I wasn't doing *anything*. Standing in this room, waiting for Darlene."

He exchanged puzzled looks with her.

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"Dar, do you remember what you were doing?"

Her eyes closed in thought. "The first time was before one of Swelk's movies. I was getting popcorn. The other time, I'd spent the night. It happened the next morning while I was showering."

Showering wasn't terribly noisy, and the only shower in the safehouse was upstairs. Kyle pinched the bridge of his nose in concentration. Hmmm. *Getting* was a rather all-purpose verb. "Were you popping the corn?"

"Uh-huh."

"In the little microwave oven in the trailer?"

She shook her head. "The microwave stuff has too much fat. I'd brought an air popper from home."

I see, said the blind man, as he picked up his hammer and saw. "The second time, did you dry your hair?" To her puzzled nod, he added, "With a hair dryer?"

"Well, yes."

Vacuum, air popper, hair dryer . . . what they had in common were electric motors. More precisely, if not per the everyday usage, electromagnetic motors. Swelk had mentioned once that the safehouse's electric lights made her jumpy. The radiation from household wiring was *tiny* compared to the E-M noise the vacuum cleaner's motor emitted.

"Kyle, what are you thinking?"

He recognized the impatient worry in Darlene's voice. "It's okay. Give me a second." If electrical appliances were the problem, why had there been so few incidents? He ran a mental inventory of modern conveniences. This old house had been chosen for its isolation, not its features. Its heat came from radiators, the circulation driven only by hot water rising and cold water sinking. The water was heated by an oil burner—no motor required. The rarely used stove burnt propane. The refrigerator and its big motor, entirely by accident out of commission. No bathroom fans. The guards came and went in shifts, so there generally wasn't showering—or, more importantly, hair drying—going on. The original land-line phone, with its electromagnetic ringer, was out of service, which was easier than guarding it.

There was a moment of uncertainty as he recalled Swelk had a television. He'd once lost a college assignment by carelessly leaving a computer disk on a TV. His doubts receded as he remembered what set she had. To accommodate the old house's tiny rooms, the CIA had followed Kyle's advice and gotten an expensive wall-mounted model like the one he owned. The upscale unit had an LCD flat screen: real low-voltage stuff. Not a CRT with big coils.

This *had* to be important.

Flickering lights triggered seizures in some epileptics. How did flickering magnetic fields affect Krulirim?

Swelk was very proud of her studies. Kyle strained to remember something in a debriefing report, something from the Krul's personal research notes. Something about Krulirim orienting themselves by reference to the home world's magnetic field.

Hmmm. Earth's magnetic field was excluded by the safehouse's shielding. Was *that* why Swelk often woke up dizzy?

"Ladies, it will be for the best if I remove this vacuum cleaner." He'd happily bet an arm and a kidney that Swelk—or any Krul—couldn't tolerate fluctuating magnetic fields, at least at some frequencies. The sixty-cycle hum of standard wall current must be one of them. It would be a simple enough experiment at Franklin Ridge to measure the field strength of the appliance that had so instantly incapacitated her.

With the crisis a mere two days away, was it too late to exploit this discovery?

"Gen. Bauer is unavailable. Would you care to leave a message?" The aide at the other end of the connection sounded bored. If he recognized the caller's voice or remembered having taken four messages from Kyle already that day, he dis-

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guised it well.

"No, thanks." There wasn't time for this nonsense, not with the tea party imminent.

Kyle hung up and redialed. When Britt's secretary wouldn't put him through either, he asked for voicemail. He had painful familiarity with the politician's total recall—anyone who had ever worked for Britt did. Today Kyle was counting on it. "Britt, I'm going to recite some numbers. What I've just learned is equally important. I *must* meet with the Mad Hatter. *Now*." Kyle had invented that alias for the leader of the raid, but Britt would surely crack the code.

He rattled off numbers in twos, each pair the month and day he'd first discussed with Britt some key finding about the aliens. The revelation that galactic "unity orbs" were spying devices. The discovery that the mothership was transparent to X-rays. The confirmation that "F'thk" lifeboats had been at abduction sites, long before the aliens' overt appearance. "He *must* meet me at my funny friend's place. Please acknowledge."

Hanging up, Kyle left Franklin Ridge for the safehouse, to do the thing in the world he was worst at: waiting.

Why was Darlene so nervous?

Swelk stared out a dark window, miserably alone. Inside the safehouse, only she and the kittens were awake; Darlene, who was spending the night, had gone to bed. Krulchuk's day was roughly three-cubed and three Earth hours in length, and Swelk was far from adapted to her new planet's speedier rotation.

Recently, Krulchukor movies seemed to fascinate Darlene. The diplomat probably understood Krulirim better than any other visitor, but that insight came from experience with only one Krul and one small film collection. Darlene did not know how many human entertainments Swelk had viewed: a lot. Human broadcasts had led the *Consensus* to Earth. The lonely Krul had watched many more hours of Earth's television than the entirety of Rualf's library. Counting the guards, Swelk's experience with humans included more than two three-squares of individuals. She was a far better interpreter of humans than the other way around.

Why was Darlene so nervous?

Trees outside the window swayed. The house creaked. A kitten scratched enthusiastically at her litter box. A beanbag chair rustled as Swelk shifted her position. Darlene was more immersed than ever in Rualf's movies. The human's excitability had intensified after a discussion about the actor's artistic sense, after that odd conversation about whether Rualf would prefer to end the filmed destruction of Earth with some human act of altruism.

Swelk dismounted from the chair to pace in imperfect circles. Darlene had been agitated by those cinematic insights, but had tried not to show it. And why the recent shift in mood to nervousness? Swelk understood worry in anticipation of impending doom—but not disguised expectation. In the nighttime stillness, bedsprings squeaked. Darlene was also restless.

Excitement at how Rualf would prefer to end the movie? Did that suggest a human intention to influence the filming? But Rualf wanted to film an epic disaster, so why would the humans care about the details? What did Darlene imagine as the act of human altruism?

Swelk paused mid-circle. Whatever this dramatic act might be, its purpose was to bring Rualf to film it. Was Rualf being tricked? Scenes from human entertainments flooded her mind, scenes she did not totally understand, from contexts foreign to her. Soldiers, criminals, imaginary monsters . . . all were unfamiliar concepts imperfectly grasped. A large part of that incomplete understanding was a preference for ambush. Violent, surprise, deadly attack.

Was a subtle appeal to the filmmaker being used to lure the *Consensus* into

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danger? Was Darlene's interest in Rualf's films focused on constructing an irresistible scene? Almost certainly, yes. Less clear was how Swelk felt about this. How had she imagined this would all end?

But killing was wrong, no matter by whom.

Her interrogators had resigned themselves to a steadfast refusal to answer direct questions about vulnerabilities of the *Consensus*—while continuing in convoluted ways to collect data. It was as if a tacit bargain had been struck. They amassed information that could be used in an attack . . . but she could believe, or rather delude herself, that she was not responsible. Swelk enabling Darlene to understand and entrap Rualf was as much a betrayal as would have been revealing any weakness of the ship.

Well, she *was* responsible—and she could not bear it if the resolution of her mess caused the deaths of her one-time shipmates.

Alone in midnight darkness, Swelk knew her existence as a solitary Krul was doomed. In "Revenge of the Subconscious," which she had recently rewatched with Darlene, Rualf confronted a flawed aspect of himself. His character had become a loner, attempting to be complete unto himself. He had naturally failed.

Now she had to vanquish *her* inner monster.

There was an outburst of mewing and thuds: playful tussling by Blackie and Stripes. Much as she loved the kittens, the image that came to mind was of larger, much more docile creatures: Stinky and Smelly. She could not endure the thought of harm to those innocent beasts.

Crossing the hall, she reared up on twos to pound on Darlene's closed door. Without waiting for an answer, Swelk entered. The cold moonlight streaming into the room made Darlene, seated on the edge of her bed, look ashen. Her hair was matted and tangled.

"I know an attack is planned on the *Consensus*. Proceeding means destruction, for you, for the Krulirim, or probably both. I want to avoid that suffering. I want to help.

"But it must be done on *my* terms."

Snow flurries swirled around Kyle and his visitor. "If this diversion costs me one casualty, I will personally rip out your heart and feed it to you." Barrel-chested, with arms thicker than Kyle's thighs, Col. Ted Blake's soft-spoken threat was entirely believable. Blake was livid at being summoned from Delta Force's base at Ft. Bragg a day before the attack on the starship. His commandos were en route to Washington as they spoke.

They were in the woods that abutted the safehouse, on whose sagging porch Kyle had awaited Blake. He brushed aside a low branch. "I understand your concern, Colonel."

"Oh? Whose lives are you personally responsible for?"

The whole planet's, but he didn't suppose that answer would be well received. "Colonel, I know for a fact neither you nor any of the Delta Force has met a Krul. Don't you want to know something about your opponents?"

"Don't tell me my business," said Blake. "*I* know for a fact that you have no military background. Now give me one good reason why I should even be here, or I'll be on my way."

Kyle exhaled sharply. Here goes. "When we go inside, I'll stay in the foyer. You go through the doorway to your left and back into the dining room where Swelk will be. Keep your eyes on her. What you need to see will happen as soon as I hear you say her name."

They returned to the safehouse, Kyle signaling with a finger raised to his lips that the agent at the door was not to speak. Inside, Swelk and Darlene could be heard talking. As Blake turned left, Kyle took an electric razor from his coat

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pocket. He plugged it into the front-hall power outlet. When Blake said, "Swelk, I presume," Kyle clicked the switch to on.

There was an immediate thud, followed by a drumming against the wooden floor and shouts of dismay from Darlene. Kyle turned off the razor. The drumming quickly faded. He clicked the razor on; the spastic beat resumed. He switched off the shaver a second time, this time unplugging it.

When Kyle entered the dining room, Darlene was hovering anxiously over the still-prone Swelk. He shrugged apologetically to them both.

Blake's glower had been replaced by shrewd calculation. "Shall we continue our hike?" asked Kyle. An agent handed him a backpack as they left the safehouse.

"What you just witnessed, Colonel, was the aliens' biggest weakness. Swelk was instantly disabled by the electric motor in my razor."

"Explain."

"Members of her species orient themselves by reference to the planetary magnetic field. Any electric motor, not just the one in a razor, converts an alternating current into an alternating magnetic field. The electromagnetic part, called the rotor, pushes magnetically against a stationary permanent magnet, the stator. As you know, wall current alternates at sixty cycles per second. I just inflicted on my friend a sixty-times-per-second reversal of her sense of direction."

"So she had extreme vertigo."

"Right," agreed Kyle. "But more than that. You saw her twitching uncontrollably. If you listened closely, you might also have heard that her computer immediately stopped translating her words. Swelk was shouting something, but while the motor ran that speech was unintelligible." The computer itself was unaffected, continuing to translate, or at least to make alien-sounding noises, in response to Darlene's English.

"Couldn't your ugly little friend be play acting?"

"She had no warning of what I did, and her response surely *seems* involuntary. That aside, it turns out the house surveillance system recorded prior incidents." Once Kyle had been told of Swelk's previous episodes, he had known to look. Darlene, who had been unaware of the hidden cameras, no longer showered there. He dug in the backpack. "Hence this videocam."

They stopped beneath a towering hemlock. Blake accepted the videocam and pushed the play button. In the preview screen, Swelk stood in the dining room, a date and time appearing in tiny digits in the display's corner. Moments later, Swelk collapsed. Kyle handed over a second videotape. The new image showed Darlene in the kitchen, overseeing an air popper. The date and time matched Swelk's collapse on the first tape.

"Check these." Kyle offered two more tapes. Once more Swelk was stricken, now concurrent with Darlene's use of an electric hair dryer.

"Maybe it's the noise, not the motors." Probing curiosity had replaced hostility.

"Nope. A razor heard across the house is quieter than Swelk's own translator. I made an audio tape of a popcorn popper and played it back on a cassette recorder. That made her ill at ease, because the recorder itself has a small motor, but how loudly I played the tape made no difference." They resumed their walk. "When I converted that same tape of popper noise to MP3 format and ran the file through an electronic player, Swelk didn't react at all."

"You're saying we can disable the ETs with a big electric motor near the starship."

The safehouse was no longer visible through the trees, but a clearing had come into view. A windswept field in Minnesota rushed to mind, the meadow from which Andrew Wheaton's family

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had been abducted. "No, the ship's hull would surely shield them. But if we can get an airlock open, penetrate that shield . . . ."

"My guys know all about penetrating things, and we're not restricted to kicking down doors." Blake's smile was frankly predatory.

"There's a fusion reactor in that ship, which will be in the heart of metropolitan Washington. The last thing we want to do is to make it go boom."

"I don't think they're going to respond to the Delta Force ringing the bell, even if all we're carrying is razors."

"*Swelk* knows how to get us in." Kyle ignored an outburst of protest. "She deduced from her questioning that an attack must be imminent."

Blake swallowed an oath. "You trust the little monster?"

"That's exactly what I propose to do: trust her. *If* we bring her, she promises to share the airlock keypad code that will let us into the ship."

"Bring an enemy to the raid." Blake was incredulous.

"Bring a defector. An *ally*. That's what I sincerely think she is. Every fact in our possession confirms that she is. If I'm right, her help will be invaluable, in operating the onboard systems after we take over the ship, in interpreting anything the crew says."

"And if you're wrong?"

Kyle swallowed hard. "I'll be very sorry. You see, I'm going to be in the lead truck."

CHAPTER 28

Rualf sat amid a ring of displays, analyzing camera angles. The ship's hull was studded with sensors. The president was in his Oval Office, ready to watch a closed-circuit television view of the ceremony while, unbeknownst to him, an orb observed him. Rualf shouted final directions to the troupe as to where their F'thk/cameras should stand. They wriggled into the robots' control suits.

Show time.

The outer door of an airlock cycled open. The ramp descended. The robots trotted down the incline and arranged themselves in an arc that faced a quintessentially human building: a hideously ugly box with huge doors. It was meant, obviously, as housing for the freaks' simple aircraft. Today it held instead a collection of Earth's primitive arts and crafts.

As always when the *Consensus* visited, the humans diverted their airplanes to other airfields. No humans were yet in evidence. That was good—the starship had visited Washington often enough that curious crowds no longer rushed to meet it. And an intimate ceremony befitted Rualf's sense of aesthetics.

A short door inset in an aircraft-sized portal swung open. The American delegation exited. As the humans approached across the concrete, Rualf whispered orders to position the robots into a slightly different configuration.

"Welcome back to Washington, H'ffl." A silver-haired human extended an arm in greeting. "Please accept the president's apologies for his unavoidable absence. He felt his presence would draw too much attention to this meeting."

The text window in Rualf's helmet provided an unnecessary reminder: Britt Arledge. H'ffl reached out one of its arms, gravely performed the human ritual. "It is good to see you again, Mr. Arledge. Please tell President Robeson that we understand."

"It would be a much happier occasion if we were about to join the Galactic Commonwealth. But that is not to be." Arledge peered directly into one set of H'ffl's "eyes": a perfect close-up. "The people of Earth have foolishly shown ourselves too immature. Perhaps the steps we are about to take are unnecessarily cautious. I pray that is so . . . but I dread it is not.

"The F'thk share your hopes and fears," lied Rualf. "We accept your trea-

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sures in trust, to show with honor across the galaxy, and, we hope, to return to you some day."

"Our cargo vehicles are loaded." Arledge pointed to the building that housed Earth's trinkets. His head bobbed in some signal, in a grotesque parody of the articulate fluency of which Krulchukor sensor stalks were capable. "So let us begin."

With the abundant energy from a spaceship's fusion reactor to run bioconverters and maintain an environment, stranded Krulirim could hope to survive in almost any solar system long enough to be rescued—if their need for recovery could be made known. That was why the *Consensus*, like most spaceships, carried amongst its provisions a collection of emergency buoys, and why its computers held directions for fabricating more. Standard practice, upon arrival at an unpopulated solar system, was to pre-deploy some buoys in case of later need.

The buoys were essentially freestanding interstellar signaling stations. That purpose required the ability to generate and store energy, to receive from a marooned crew the specific details of the call for help, to convert those specifics and that accumulated energy into coherent microwave pulses, and to aim the message pulses precisely at a distant target star. Each buoy was a solar-powered satellite, with a powerful onboard computer, a remote-control interface for programming by the presumed stranded crew, and precision sensors for aiming.

Point that powerful maser downward at planetary targets, rather than across interstellar distances, and the buoy was an enormously destructive weapon. The *Consensus* had ringed the Earth with two three-squares and three of such weapons.

Grelben straddled the squat padded cylinder that was his command seat. Displays encircling the bridge showed a panoramic view of the landing site and the unfolding of Rualf's climactic scene. Other displays updated him regularly as to which masers had a line of sight to this airport. Parking a few buoys in synchronous orbit would have eliminated that tedious task, but the humans had that near-Earth region filled with their own satellites. Keeping his buoys secret had meant putting them in inconvenient orbits, where they could not hover over a fixed terrestrial location. Keeping the satellites secret had also required making them invisible to radar, and grafting radar-canceling mechanisms to the buoys had made his hybrid devices sporadically unreliable. To be certain of killing a target, he had to assign several buoys.

He periodically glanced at the unfolding ceremony. "Some of my people's greatest accomplishments await within those trucks," a gray-topped human was saying. Grelben wondered whether these Earth mementos could somehow be sold—as movie props and souvenirs, of course, not as real artifacts. There would be time to sort that out on the long trip home.

"And now we commit our treasures to Earth's new friends. . . ."

The *Consensus* had never landed this near to buildings—he had always insisted on wide separation, the better to escape from potential surprises by an emergency launch—but Rualf's 'artistic integrity' for this scene dictated a cozy, confidential setting. *Can we move this along?* fumed Grelben. He felt exposed down here.

Alas, the onboard lasers could only fire forward, since in space the ship was only at risk from junk overtaken in flight. So here he sat, watching anxiously in all directions for he knew not what, tracking the buoys as they orbited in and out of line-of-sight. If a threat did materialize, and none ever had, he would have to select a target, pinpoint its location, and uplink those coordinates to a satellite. It was also hard to know in advance with what maser frequency to strike.

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Ship's sensors would monitor his target for scattered energy; if too little energy were being absorbed he would have to reprogram the attack frequency.

Yes, he would have been *far* happier with what had become a routine landing: in the center of a human airfield, far from any possible hazard. Grelben had no reason to doubt that the humans, who had never in any way threatened his ship, had no intention of making trouble today. Rualf kept assuring him that the humans were entirely intimidated by the light show made manifest near Earth's moon. The freaks *should* be overawed by it, even if the main cause for fear and dread had yet to be manifested. But it would. . . .

From the shadow beneath a retractable passenger walkway, Andrew Wheaton surveyed the idle runways of Reagan National Airport. A Baltimore Orioles cap, bought that day as camouflage, shaded his eyes. His FAA ID tag from St. Cloud Regional dangled from his coat zipper. He ambled to the traffic noise from the nearby George Washington Parkway, trying to project a casualness he did not feel, onto the deserted field. The top of the spaceship peered over a line of hangars.

Chewing an unlit cigar, he sauntered to the fuel depot and a row of parked tanker trucks. With air traffic diverted for the aliens' visit, the drivers had the afternoon off. In Andrew's pocket was the heavy ceramic ashtray he'd taken from a workers' lounge. He threw the ashtray through the driver's window of the end tanker. Reaching through the shattered glass with a gloved hand, he unlocked the door.

Andrew had rewired the farmhouse twice; hot-wiring an ignition did not phase him. The truck was already rolling when someone burst from the depot to check out the noise. The watchman receded rapidly in Andrew's rearview mirror. Cold wind spilling through the broken window whipped the cap from his head.

Those F'thk bastards who had stolen his family would now pay.

A cargo van, supposedly the first of many, approached the awaiting starship. Kyle was the van's passenger. His heart pounded as they started up the ramp into the gaping airlock. F'thk watched silently from the concrete; others of the robots awaited in the airlock itself, to assist with the expected unloading.

"Ready?" Col. Blake drove one-handed, his other hand resting on the parking-break lever. He was of the "I won't ask my men to do anything I wouldn't do" school. Oddly, Blake saw no inconsistency in hinting Kyle was a few beers short of a six-pack for accompanying him.

What would Blake do if I answered no, wondered Kyle. They were nearing the top of the ramp. "Let's do it."

"Okay." The commando slammed on his brake pedal and yanked the emergency brake lever. They squealed to a halt with the van's tail hanging out of the airlock. "Sit tight." The advice was unnecessary. The F'thk in the airlock were being torn apart by a hail of bullets from hidden snipers—and from the Uzi Blake had retrieved from the glove box to fire through the windshield. The same fate befell the more exposed robots on the ground. As if in slow motion, the outer airlock hatch clanked impotently against the reinforced van. "Go, go, go."

They flung open their doors. The control panel was right where Swelk had said it would be, its buttons labeled in spidery characters reminiscent of the keypad on her computer. Familiarity was not enough; two human hands did not begin to have the dexterity of the nine fully opposable digits at the end of a Krul limb. Grinding his teeth, Kyle tried again and again to press precisely the sequence of key clusters he had memorized.

It didn't help that Blake, who was ap-

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distrusted her. The trailer doors were secured by a keypad device. The irony that she had revealed the keypad code to the *Consensus* was not lost on her. What was lost on the people streaming in and out of the trailer, however, was that a Krul saw in a full circle—she was in no sense "facing" one of the walls of instrumentation as were her human companions. She had already espied the code that would let her exit. That knowledge was of no practical use—this trailer was the only enclosure in the vicinity shielded against Kyle's impromptu magnetic weapon.

A cheer rang out. Swelk quivered, though the reaction must be only nerves. Actual exposure would have incapacitated her. Kyle must have succeeded in opening the airlock door. Please be all right. Please be all right. Images of her shipmates, of the Girillian menagerie, of Kyle alternated in her mind. She was not certain for whom the wishes of safety were most fervently intended. Please be all right. Please be . . .

The mass of people in the trailer had fallen suddenly, ominously silent.

Truly awful violin music screeched from the Walkman cassette recorder Andrew Wheaton had brought to the airport. Wild clapping greeted the end of the tune. "That's *great*, sweetie," Tina encouraged. "Play it again for Mommy?" Andrew laughed through his tears, remembering what Tina had later admitted—she'd had no idea what Junior had played.

"Thank you, Mommy," answered a voice as sweet as the music was tortured. Screeching resumed. Tina's *again* was the single clue this shrieking was related to the earlier "tune."

Andrew brushed away the tears, but left the tape, the final recording of lost wife and child, running. Swinging the stolen tanker truck around the end of a row of hangars, the alien ship loomed before him like a beached whale. The truck had fishtailed coming out of the curve; he eased up on the gas, lining up on one of the vessel's landing legs. He patted the photo of the three of them he'd taped to the dashboard.

Then he pushed the gas pedal to the floor.

He was astonished to see puffs bursting from the concrete. Moments later, the tanker lurched, its rear dragging. People were shooting at him—or at his tires, anyway. Were there troops here to protect the murdering devils? The truck swerved and swayed as he fought to control it. One of those swerves revealed a ramp leading into the ship. Newscasts often showed the outer airlock hatch open at the top of a ramp.

A low armored truck, a "high mobility vehicle," sped from a hangar, rashly trying to cut him off. There was no need to see if that driver truly was suicidal—better to sweep around and charge up the open ramp. Another humvee raced up parallel to him. He didn't hear these shots either over Junior's playing, but his windshield filled with holes. The wind of his forward motion pressed against the weakened windshield. The glass shattered, countless shards stabbing him in the chest and face and arms.

He patted the St. Christopher's medal that dangled from the rearview mirror, and once more the photo. "See you soon."

The ramp was directly in front of him.

Either the roar of the portable generator or the boom of the back-up explosives was the commandos' cue to race across the tarmac from hangar to starship. No part of the plan involved a tanker truck—but one was nonetheless barreling toward them.

Kyle couldn't make out much detail at this distance. The tanker driver had pale hair, dark eyes, and a cigar in his mouth. Then it hit him: Andrew Wheaton. Kyle never doubted that the grieving father and husband meant to crash into the ship. Blake's soldiers were at a loss, unable to stop the tanker and unwilling to

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plying plastic explosives to the inner hatch, kept bumping into him. One way or another, they were going to get inside, because only a crew held hostage could disable whatever doomsday devices they had deployed.

"Take off!" screamed Rualf. The edge in his voice came partially from simple desire for instant obedience, but mostly from irrational terror. The rich data stream from the robotic control suit gave an illusion of reality that while normally a convenience had without warning become a near-death experience. Rualf had just suffered the tearing apart of H'ffl's body and the final spasmodic misfirings of dying sensors. "Grelben! Get us out of here."

From the computer in Rualf's pocket came a shouted reply. "I *can't* take off. The outer door is jammed, and the ramp is designed not to retract with the airlock open. I have someone trying to override the interlock. And these freaks you promised would never attack? They radioed a demand for our surrender."

With shipboard sensors Rualf saw that all the outside robots were down. A camera viewing outward from the airlock showed two busy humans inside and more vehicles converging. Only the inner airlock hatch separated him and his troupe, all struggling to extricate themselves from the teleoperations suits, from their assailants. The hatch suddenly seemed a very flimsy and inadequate defense. "Grelben! Use the satellites. Blast them."

"Blast what? Our own ship?" came the angry answer. There was a pause. "Maybe I can use the masers on nearby buildings, or parked airplanes, to create a diversion. Get ready to drive out an unblocked airlock and tow the . . . oh, shit."

"What!?" Rualf was finally free of his suit. Fleeing the cargo bay, he could not put from his mind the humans at the airlock controls. How could they possibly expect to find the command sequence? As he waited for the zoo hold's inner airlock hatch to cycle, he interrupted Grelben's cursing. "What's wrong?"

"Get a hovercraft out *now*." The captain's voice was grim. "The buoys are under attack."

With a liquid hum, the airlock controls finally responded to Kyle's inputs. "Back inside the van." There was no way to know what might come at them through the hatch he'd been so eager to open. On the rear deck of the van was a gas-powered, 7000-watt electric generator. Several multi-outlet surge protectors were plugged into the generator. From the surge protectors, in turn, hung two vacuum cleaners, a leaf blower, a belt sander, a kitchen mixer . . . pretty much every motorized appliance in Kyle's house.

"Fire in the hole." He mashed down the generator's ON button. As the engine roared to life, he and Blake began switching on appliances. The noise was deafening. As he stepped down from the van's side door, the inner airlock hatch *thunked* into its fully open position. Krulirim writhed and thrashed on the deck, some with limbs entangled in unrecognizable equipment. The thunder of the portable generator masked any sounds the aliens may have been making.

Just as Kyle was thinking *victory*, he was jerked roughly around. He lip-read, rather than heard Blake's words. "We have a problem."

The overcrowded trailer in which Swelk anxiously waited was ripe with an odor she did not recognize. Despite every effort to keep out of the way, she was bumped and bruised. The humans stretched, contorted, and strained to look past one another at the instruments and display panels lining the trailer's walls. Darlene tried to report status occasionally, but the cacophony of speech rendered the translator mostly useless.

It grieved Swelk that the humans still

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risk setting it afire as it sped toward their objective.

Could he deflect the tanker? Keep it from climbing the ramp? Kyle gestured; Blake followed him back to the van. The generator weighed nearly 250 pounds; grunting, they shoved it out the van's side door onto the airlock floor. Electric cords yanked loose; Kyle threw appliances from the van. "Plug it all back in!" he screamed into the sudden comparative quiet. He jumped into the driver's seat and threw the van into reverse.

Rualf thrashed and convulsed, as all around him animals calmly circled their cages or nibbled their fodder or stood watching him. *Whatever* had rendered him helpless had no effect on the Girillian beasts. Hearts beating erratically, limbs flailing, he tried to call out for assistance. His words were unintelligible, even to him.

When would it end? *Would* it end? That second question had just occurred to him when the phenomenon, whatever it was, abated. Limbs quivering, he climbed falteringly from the deck. How much time had been lost? To save a few seconds, he keyed in the override that opened the airlock's second hatch. He *had* to get outside with a utility hovercraft, had to drag the human's obstruction from the other airlock, so that they could escape.

He was staggering towards a hovercraft when the invisible forces, whatever they were, surged anew. Rualf dropped again to the floor, in helpless terror of whatever might come through the airlock that now gaped open, entirely unguarded.

A cargo van burst in reverse from the airlock. It bounced down the ramp, gaining speed, aimed right at Andrew. Sorry, fella, he thought in utter sincerity. He maintained course.

At the last moment, the van driver dived out, to be struck brutally by his own door. The van veered, whether from a final tug on the steering wheel or the drag of the open door. As the tanker smashed into the van, Andrew was glad to see the driver had tumbled clear.

The tank tried to go straight even as cab tipped going over the van. As Andrew fought the skid, the cab's wheels slammed back down, the front left wheels of the tank hit the crushed van, and the steering wheel twisted out of his hands.

The rig jackknifed. The tanker spun and scraped along the concrete, raising a sea of sparks and a sound like the end of the world. The overturned vehicle kept moving forward. Near the base of the ramp, the tank ruptured. Clear liquid and the stench of kerosene streamed toward the starship and its gaping port. Battered and bruised, Andrew saw a second person leaping from the ramp. Run fast, he thought, as another bounce cracked his head against the side window.

A spark ignited the spilled jet fuel. The devils who had taken his family were doomed.

CHAPTER 29

Groaning, Kyle crawled away from the heat and flames. After a few painful yards, he was grabbed under an arm by Ted Blake, who half-dragged, half-carried him from the hell that had erupted. Blake left him propped against a hangar wall, goggling at the raging inferno. He had by sheer good luck rolled behind the wrecked van, and been sheltered from the worst of the fireball.

What did this all *mean?* After his leap from the speeding van and the explosion, he couldn't think straight. Of one thing he was certain: Wheaton was dead. How many Krulirim had the man taken with him?

Darlene appeared from somewhere. "Kyle!? Are you all right?"

He failed miserably in an attempt to smile, but vomited noisily without effort. "I've been better." Still, his mind was clearing. The airlock he had with

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such difficulty opened was engulfed with flames, entirely impassable. And apart from the flames, the ship *looked* funny. It was at an odd angle; a landing support must have been snapped by the blast.

The fire and explosion had surely incinerated the generator and his sorry collection of appliances. Swelk always recovered quickly after a electric motor was switched off. If any Krulirim survived, maybe on the opposite side of the ship, they would be recovered by now.

What would they be doing?

For time without measure, the deck fell from beneath Grelben. The walls spun around him, receding into infinite space. He somehow floated and fell simultaneously, limbs spasming. When the sensation faded, he pulled himself onto his command seat. Bridge displays showed F'thk robots littering the concrete, mostly torn to pieces. On other screens, a human ground vehicle racing toward the deployed ramp. The inner airlock door had been opened during his incapacity. His ship was exposed! Before he could engage the remote-hatch override, the onslaught of vertigo resumed. He toppled from the seat, limbs entangled.

The explosion that rocked the *Consensus* penetrated even the chaos into which he had once more been plunged. The mysterious disorientation stopped, but his still-quaking limbs refused at first to function. A searing wind burst onto the bridge, tossing the duty crew like leaves. The bridge displays went blank; his dazed mind needed a moment to deduce that the hull cameras had protectively retracted. It was an automatic mechanism, normally triggered by the heat of an atmospheric entry. Hull sensors reported a soaring temperature. As bodily control returned, he slapped the audio reset on the alarm panel; its many flashing lights told him everything that he needed. Fire suppressant sprayed from nozzles in the ceiling.

"Brelf, you're on damage control," he snapped at the first live crewman he saw. His attention remained fixed on his ship's defense. "Rualf, report. Rualf." There was no response. The alarm panel revealed a raging fire in the cargo hold where the troupe worked. It seemed impossible that anyone there had survived.

Communications with the robots ran from the incinerated controls in the hold to the ship's radio center to antennae in the hull. The high-gain antenna dishes, like the exterior cameras, were retracted and useless. One antenna, however, was molded into the hull itself. That configuration made the antenna necessarily omni-directional, dispersing energy with profligacy in all directions; but his immediate needs were short range. With that antenna he broadcast to the robots. He couldn't control them with bridge equipment, but he needed to see through their sensors.

Only three robots responded, and their images came from close to the tarmac. Just one view showed the ship—and that picture made him knot his digits in rage and fear. Amid billowing black smoke, flames licked hungrily at the *Consensus*. The ship had tipped, its stern flattened where it had struck the ground.

More and more lights glowed on the alarm panel. "Captain," called Brelf. "Fire is spreading throughout the ship. Most controls are damaged, unresponsive. The drive. . . ."

The crewman did not need to complete his thought. Without the interstellar drive, nothing else mattered. They were marooned, at the mercy of the freaks whose extinction he and Rualf had conspired to cause. Without access to the high-gain antennas, Grelben could not even control the satellite weapons. They were without hope, he thought.

But not without options. . . .

Images of the *Consensus* in the grip of flames looked down at Swelk from

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three walls. Her view of the command-trailer instrumentation was suddenly unimpeded. Darlene had been the first out the door; others, to whom no one had bothered introducing Swelk, soon followed. She cringed the first time after the explosion that the door opened, but the horrifying dizziness did not strike. The fire must have destroyed Kyle's weapon.

The soldiers who remained had eyes only for their equipment . . . while *her* vision, as always, went in a full circle. No one was watching her. She had either been forgotten in the excitement, or the humans had excessive trust in their locked door. She tapped out the key code that unlatched the trailer door. A hinge squealed as she pushed against the door. As she jumped out, one of the uniformed men in the trailer lunged at her. He crashed to the trailer's floor, half of his torso hanging outside—but caught her by her belt. She tore loose, but the pocket in which she kept her computer ripped. The computer fell to the pavement just outside the hangar. There was no time to stop for it. She screamed as she ran, "I must help. I must help." Those giving chase gave no signs of having understood her.

An eye aimed anti-motionward, toward the hangar, saw Kyle. He was bloody, agitated, and screaming. The evidently unbroken computer translated, "Don't shoot." Not waiting to see if that advice would be taken, she fled toward the *Consensus*. She ran no faster than the men in pursuit—an unlame Krul would have left them far behind—but with her three-limbed ability to veer instantly in any direction, she was much more agile. She could also see them coming, from whatever bearing, and her shortness made her hard to grab. She dodged and bobbed, unable to outpace them, but—however precariously—at liberty. Bright red trucks raced toward the *Consensus*, sirens blaring. From the hangar came the shouted words, anguished even in translation, "I'm sorry, Swelk. I'm sorry."

Reaching the ship, she found she was more tolerant of heat than the humans. She stood near the blaze, panting in exhaustion, for the moment beyond the soldiers' reach.

Through the flame-filled airlock came the panicked bellowing of the swamp-beasts.

Swelk had run here impulsively, unable to stand idly by when the only Krulirim within light years were imperiled. No, be realistic . . . the survivors would all *die* if they did not get out.

Another terrified howl rang out. Despite the roar of the fire, she knew it was Stinky. His renewed call was joined by his mate. As flames billowed from the open airlock, Swelk realized: something inside is fanning those flames. She galloped around the hull, sticking close to the ship where the soldiers could not follow. A *second* airlock was wide open; she could feel the draft of air being sucked into this hold by the raging fire. This hold's ramp was unextended, but the landing foot's collapse brought the entry within reach. She clambered aboard.

She found herself inside the zoo hold. Her Girillian friends screamed in fear, hurling themselves again and again against their cages. Fire suppressant streamed from nozzles overhead. She ran between the pens, unlatching doors. The heat seared her lungs. "Get outside!" she screamed at a Krul she found fallen but stirring beside a cage. Soot-covered, he was unrecognizable. Whether the disorienting weapon or the explosion—or perhaps both—had downed him she could not tell. "Out the hold airlock."

Ignoring her own advice, Swelk limped deeper into the ship. Two crewman stumbled by her, bleeding, dazed, purposeless. "To the zoo hold," she called as she pushed on. Flickering emergency lights guided her to the bridge, through corridors ever thicker

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with smoke.

She arrived, finally, gasping for breath, at the command center. Still bodies littered the room. Only one Krul worked purposefully: Captain Grelben. He toiled feverishly at a console, so rapt in his duties that he did not at first see her enter. He ignored the alarm panel that glowed from top to bottom in the purple blinkings of worst-case disaster. "Captain. Come away."

"Swelk." His voice was cold. "I trust we have you to thank for our difficulties." A coughing fit interrupted him. "It does not matter. Your freaks are doomed."

Predestined in his mind to fail, because of Krulchukor prejudice? Or condemned by his plans, by some twisted revenge the captain still strove to inflict? "Captain. There is still time to get off the ship. We can live here. The humans are good people." The smoke was choking her. "Will you let them find their own way?"

Grelben reared up on twos, sweeping the third limb through a broad arc. It somehow encompassed the death and destruction on the bridge and throughout the ship. A hacking convulsion deep in his torso made him wobble, his upraised limb tremble, ruining the grand gesture. "*This* is their way. *Death* is their way. So run away, mutant, but it will do you no good.

"Before I am done, you and your disgusting freaks will experience death on a scale beyond your wildest imaginings."

Kyle pressed a bloody cloth to his head. Darlene sat beside him, her back, like his, braced against the hangar wall. Fire trucks were spraying foam on and around the ship. They had had some success containing the blaze, but the flames leaping from the *Consensus* itself were growing. Blake's men ringed the ship from a distance.

"Not bad for an amateur." Blake, who looked as spent as Kyle felt, was on his feet and in complete charge. Several of the Delta Force stood nearby. Whether the compliment referred to Kyle's efforts or Andrew Wheaton's suicide attack was unclear. "You'll be pleased to know the weapons satellites are inactive."

"That is good news." Kyle's tone belied his words. Swelk had gone into the burning ship. Could she possibly survive?

"So are we safe now?" asked the colonel. "Is it over?"

"I don't know. Even if the aliens are dead, there are systems on board we know nothing about." Kyle tried to think past his pain and worry. The Krulirim had an interstellar drive, artificial gravity, bioconverters—incredible technologies he did not begin to understand. How could he possibly say whether the fiery destruction of such equipment would release uncontrolled forces? That was just one of many reasons why the plan had necessarily been *capture* of the ship. Quit it, he told himself sternly. Don't waste time on useless speculation. What can you usefully contribute? "They have a fusion reactor. You can think of it as a controlled thermonuclear bomb. The biggest danger may be the reactor blowing."

"How big a problem are we talking?" Blake was amazingly matter of fact.

"We have no way of knowing. If they're good engineers, though, there will be safety shutdowns." Kyle's head throbbed as secondary explosions wracked the starship. "Be happy for one difficulty we don't have. Swelk knew that their reactor fused helium-three. If they'd used hydrogen isotopes, like our experimental fusion reactors, we'd have faced an enormous explosion. Think Hindenberg, but much bigger—even without a nuclear event."

A commando had appeared at Blake's side. "Sir, you should see this. It was found on the tarmac near the command trailer."

This was Swelk's pocket computer. No sooner had Kyle recognized it than it

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spoke. "Captain. Come away."

"Swelk." answered a second voice. "I trust we have you to thank for our difficulties. It does not matter. Your freaks are doomed."

"I remember," whispered Darlene. "Swelk had hidden a pocket computer on the bridge. That's how she determined what the plotters were up to."

"Right." Kyle tried to recall everything he'd learned or surmised about Krulchukor computing. What he called Swelk's computer was more—it was also a communications device. All such computers on the *Consensus* were wirelessly networked. The Krulchukor magnetic sense was indifferent to radio frequencies, just as human eyes were indifferent to ultraviolet light. And with inner *and* outer airlocks doors open, the ship's wireless network must now extend onto the airfield. They were near enough for the device hidden on the bridge to network with the unit Swelk had dropped—a unit still set to translate to English.

"Before I am done, you and your disgusting freaks will experience death on a scale beyond your wildest imaginings."

"Congratulations, by the way,"

Swelk felt the captain's scrutiny. She was covered with burns, oozing fluids from countless scrapes and burns. "For what?"

"For a successful escape. For surviving this long." Grelben seemed indifferent to the state of the alarm panel, where lights were increasingly switching from crisis purple to an even more ominous *off*. Panels and consoles around the bridge sprayed sparks. He coughed, choked by smoke, fire suppressant, and unknowable fumes. "For the cleverness of your bilat friends."

"System integrity at risk. Redundant equipment failures. Safety shutdown of reactor in three-cubed seconds." The ceiling speakers crackled and hissed.

"I could override the shutdown. It would turn this side of the continent into a large hole."

"No! Do not do that. You *must* not do that!"

"Why not?" Grelben whistled in amusement at her. "This ship was *everything* to me. Look at it now."

"The humans should not suffer for what I have done. I brought us here." Her thoughts raced, even as she felt her body succumbing to the heat and toxic gases and injuries. "If you want someone to blame, it should be me." She had been *so* proud of herself for spotting Earth's broadcasts. She had done everything in her power to convince him to bring the *Consensus* here. That Grelben had agreed for his own dishonorable reasons did not mitigate her responsibility. The depth of her presumption stunned her. How arrogant it had been to undertake a personal exploration of Earth rather than report her findings to the authorities on Krulchuk. Pride blinds the eyes, her old nurse liked to say. Swelk's pride had caused all this.

"Safety shutdown of reactor in two three-squared seconds."

"I blame you. You do not need to doubt that." A rumble deep in the ship made his words hard to hear. "What say you? Would you like to go out with a bang?"

"Captain, *please* let the reactor shut down safely." Her hearts pounded in fear, in guilt, in dismay. The mass murder Grelben envisioned was, like Rualf's stage-managed war, almost too large to grasp. One way or another, she knew she was dying, and another extinction also clutched at her. "Let the crew escape. I lived here—all it takes is standard bioconverters. They can live here, too. You can live here."

"Safety shutdown of reactor in three-squared seconds."

"A captain without his ship? I do not think so." He clenched all the digits of an extremity in violent negation. "Nor will, I think, sane Krulirim follow your example."

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She had to keep him talking. A few more seconds, and the shutdown would be complete. Amid so many crashed systems, the reactor could not possibly be reactivated, to become once more a threat. "Let that—" a wave of smoke erupted onto the bridge, gagging her. She hacked and coughed, unable to speak. Would she fail, in the end, simply from an inability to get out the words? With a violent rasp, she spit out the pitiful remainder of her argument. "—be their decision."

"Safety shutdown of reactor in three seconds . . . two . . . one."

"Get out of here," coughed Grelben.

"Reactor shut down. Plasma has been vented."

Swelk groped through smoke-obscured corridors as fire crackled within the walls. Had her feeble words in the end swayed the captain? Whatever the reason for his forbearance, she was grateful. But she could not forget his taunt: "Nor will, I think, sane Krulirim follow your example."

Could she not avoid the guilt of the whole crew's death? "Revenge of the Subconscious" flashed into her mind. Was *she* not the monster? She lived apart from her people—of necessity, she always told herself, but was that entirely true? Did she relish her uniqueness? There was no denying that her personal actions had brought a shipload of her kind here. Brought them to a world of bilats, who—however justifiably—were now slaughtering the Krulirim. She *had* to convince the ship's survivors to escape with her.

Swelk turned from her path toward the zoo hold to save her people.

Grelben tripped and fell over a body in the almost impenetrable smoke, the impact knocking the wind from him. Inhaling reflexively, his lungs filled with noxious fumes. He retched repeatedly crawling through the murk for an emergency respirator.

Limbs weak and shaking, he regained a secure position on his command seat. He removed the breather from his mouth. "Status comm." His rasping voice was no longer understandable. "Status . . . comm," he repeated with exaggerated enunciation. The hologram that formed was too attenuated by smoke to be read. "Flat . . . screen . . . mode." He leaned toward the display, bending a sensor stalk until it almost touched the flat surface. Comm remained, in theory, operational. He could send a message with any antenna he did not mind losing in seconds to the flames gripping the hull. "Command . . . file . . . 'Clean . . . Slate.' "

Sucking oxygen again from the respirator, he recalled with amusement Swelk scuttling to what she considered safety. The mutant believed she had dissuaded him. Well, in a way, she had. She had convinced him that the quick death of a fusion explosion, for her and those who had abetted her, was too kind. So there had been no need to keep the reactor hot while he finished his other business. "File . . . open." A deep breath from the respirator. "Send . . . file."

"Help me up." Kyle's unaided attempts at verticality were feeble. "Hurry."

Blake grabbed his outstretched arm and tugged. "You should be seeing a doctor. From our minimal acquaintance, though, I sense you're not big on taking advice."

Kyle ignored him. "Dar, help me out to the ship."

"Sergeant," bellowed Blake. He waved to a woman in a humvee. "Drive my friends."

Darlene helped him into the low-slung truck, and seconds later, out again. They joined the soldiers who surrounded the wreckage, and the fire crews who had contained the blaze. They made no attempt to douse the ship itself. Kyle could not find fault with their decision not to endanger whatever fire-

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fighting mechanisms were built into the vessel. "This is too reminiscent of the night I met Swelk. Her death in the flames of the very ship she had successfully escaped . . . it's so awful. I can't help but picture Rualf laughing mockingly."

"Convincing the captain to let the reactor shut down . . . she saved our lives, the lives of untold millions. She really is a hero."

"I know."

He could no more stand still here, baking in the intense heat of the fire, than he'd been able to sit and watch from across the concrete apron. He started limping around the ship; Darlene followed in silence. There was a second open airlock. Through heat shimmers and smoke he saw motion within. Survivors? Were they afraid to come out? "Hand me Swelk's computer? Come out. You will not be harmed." The computer emitted the vowel-less noise with which it always spoke to Swelk—at a low volume that could not possibly be heard inside the ship. "Computer, maximum sound level." It babbled back, no louder than before. "Computer, as loud as possible." Repeated paraphrasings had no effect.

What else could he try? Yelling. Perhaps it would translate louder if he spoke louder—and so it did. "Come out! You will not be harmed!" The Krulchukor equivalent, a vowel-less eruption, burst forth. Moments later, two metal containers were flung from the open airlock.

"Don't shoot!" hissed Kyle to the startled commandos. The devices were clones of Swelk's bioconverters. The translation of these words, hopefully, was too soft to be heard inside. "Come out!" he screamed again.

Rualf struggled to remain upright, dazed by the latest explosion to rock the *Consensus*. Smaller blasts sounded throughout the ship. Smoke thickened even as he marveled, stupefied, at the disaster. The hatch into the heart of the ship flapped between half- and full-open, its motorized mechanism thudding in abrupt reversals, unable to respond to fire both inside and out. With a spectacular tearing sound, the machinery stopped.

A gale whistled through the hold, sucked through the gaping airlock and stoking the spreading blaze like a bellows. The open airlock . . . that was his only hope of escape. He had a vague recollection of someone telling him so. Had one of the crew, or of his troupe, already come through here? No—whoever it was had gone *into* the ship. Some foolish hero type. He stumbled, limbs still quivering from what must have been a human weapon, toward the lock.

An impossibly loud feminine voice shouted from outside. "Come out. You will not be harmed." Had humans learned to speak like Krulirim? How could that be? Somehow, the thundering voice was familiar.

Swelk!

The Krul who had gone past him, gone deeper into the ship . . . it was she. *She* was the reason the humans knew to stage a scene he could not resist filming. To bait a trap. The impossibly loud command, doubtless synthesized by Swelk's computer, nearly paralyzed him with fear. What would the humans do to him if he fell into their power?

A wave of coughing came over him. He was dead if he stayed here. But if he were the only survivor . . . the humans would not know he was the one responsible for directing their photogenic self-destruction. He waded through smoke to the interior hatch with its broken motorized controls. The hatch that had inconveniently frozen half open. There was an access panel beside the controls; he flipped it open to get at the manual crank. Wheezing, he worked until the heat-warped door was fully shut—then he snapped off the handle. The wind whistling inwards from the lock, due to fire-fed suction into the ship, died

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abruptly as the hatch slammed shut.

Time for his escape. He groped toward the beckoning airlock, low to the deck where the air was slightly fresher. Fodder, animal shit, the Girillian ferns they had started synthesizing for the animals to shit on . . . stuff was piled everywhere, and more and more of it was burning.

He was forgetting something. Escape to what? *He could not survive without Krulchukor food.* These beasts ate synthesized food, surely. Behind a cage he spotted what must be bioconverters. Gripping with one limb the handles of two heavy synthesizers, he dragged them, awkwardly, to the airlock. He flung them outside, and went for more.

"Come out!"

Something monstrous emerged from the smoke, as though summoned by the imperious demand. A bilateral head on a thick neck towered over him, like a ghost of the F'thk. Rualf had just recognized it for a Girillian creature when it knocked him over. Massive hooves pressed him into the metal deck. Agony washed through him—but to lose consciousness now was to die. As he tried to lever himself upright, a Girillian carnivore ran over him. It was smaller than the first animal, but its feet were studded with talons. Rualf collapsed, screaming, to the floor. Thick smoke filled his lungs.

As Rualf lay quivering, limbs splayed, bleeding and coughing, battered and bruised, apparition after apparition burst from the smoke and flames. The biggest were deep within the hold, as if herding the rest. He sprawled, helpless, as creature after creature stomped and slashed him, each encounter inflicting new anguish.

The last thing Rualf ever saw was the huge flat foot of a swampbeast descending upon the center of his torso, directly over his sensor stalks.

The commandos flinched as a six-legged creature leapt from the open airlock. Only that moment of surprised nonrecognition saved the animal. "Hold your fire!" yelled Kyle. As Swelk's simulated voice reverberated from starship and hangars, he searched for and found on the computer what he hoped was its microphone. He covered the aperture with his thumb. "Hold your fire!" Muffled, the repetition went untranslated. He'd seen such a creature before—in a hologram projected by this very computer. "It's a zoo animal. There may be more."

Animal after animal appeared out of the smoke and flames. They retreated in confusion from burning ship and human building, lost and confused, huddling together. If the Girillian menagerie included predator and prey—and Kyle was almost certain from Swelk's tales that it did—the xenobeasts were too overwhelmed to care. He'd never quite believed the stories of terrestrial predators and prey fleeing peacefully side by side from forest fires—now all skepticism vanished. "Call the National Zoo. We need gamekeepers, pronto."

"Swampbeasts. They're beautiful." Darlene's voice was quietly awestruck. She pointed, quite unnecessarily, at two magnificent, web-footed animals that stood about eight feet tall. They were the last to emerge from the airlock now impenetrably thick with smoke.

She gently took Swelk's computer from Kyle's hand. Walking slowly toward the knot of shivering animals, she crooned, "Smelly. Stinky. Smelly. Stinky." The computer repeated something after her, softly. The swampbeasts pushed forward. Bowing their heads, they approached cautiously, eyes wide and staring. They brushed their enormous heads against Darlene's outstretched hand, then settled to their knees beside her.

Swelk's computer did not translate "humph," but that was okay. They understood what it meant.

Swelk coughed and spat, splattering a smoke-blackened clot of blood against

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the bulkhead. The clot sizzled. Despite the fire-suppressant sprays, fire was everywhere. Her skin was blistered. Her extremities had been so repeatedly scorched that she no longer felt them.

The initial fireball had burst through the open hold where Rualf and his troupe had been working, killing everyone. She had no idea why the hatch to the ship's interior, never unlocked when she was aboard, was now wide open. The ship's corridors had channeled the fire and blast, catching most of the crew at their posts. The draft from the second airlock had deflected the fireball from parts of the ship, sparing the bridge from the worst of it.

And saving her Girillian friends.

She had explored the *Consensus* from end to end, and there were no survivors. She omitted Grelben from her tally. He would surely refuse to leave the ship. Captain's prerogative. Captain's curse. Captain's penance, too, she considered, still unable to wish upon him, or anyone, death in this manner.

She had been lost repeatedly in the smoke, been saved more than once by providential discoveries of emergency respirators. Their capacity was limited, and she'd left a trail of empties behind her on her trek. She finally found her way to the hatch that led to the zoo hold and safety.

The entrance was shut and inoperative.

Frantically, she tore open the access panel to get at the manual override. The crank stuck after a quarter turn. Crying in frustration, she tugged and tugged. It would not budge.

The corridor grew ever hotter. Gagging, Swelk limped to the cargo hold where the fire had begun. The flames there remained impenetrable to vision, let alone passage. She could not get off the ship. She turned inward, stumbled to the bridge, feeling herself roasting.

"I did not expect to see you again." The captain was slumped across his command seat, his limbs and sensor stalks limp. A command console behind him flashed insistently.

Swelk could not see the console—the flashing was an alarm of some kind, she assumed—but its light pulsed luridly through the thick, billowing smoke. "No Krul should die alone."

Grelben winced at her words. "You are a better Krul than I give you credit for." When she did not comment, he added, "You are a better Krul than many of us.

"Let me show you something. Look closely; the outside sensors burn off in seconds when I expose them." A gagging fit interrupted whatever explanation he was trying to make. He gestured at a flat display. "Section . . . three . . . two . . . two . . . camera . . . on."

Swelk peered through swirling smoke into the little display, flat like a human television. A sense of warmth, totally unrelated to the fires ravaging the starship, suffused her. The Girillian animals, her friends, were wandering on the airfield. There was no mistaking the two who were settled calmly beside Darlene: Smelly and Stinky. As the swampbeasts extended their long necks to be touched, the image dissolved into a blizzard of static.

"Sorry, Swelk. That's my last outside sensor."

They sat—together—in companionable silence until consciousness faded from them.

Except for smoke and hungry flames, all that moved on the bridge of the *Consensus* was the text still blinking on the command console.

"Clean Slate acknowledged." ■

To be concluded!

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THE REFERENCE LIBRARY Tom Easton

Omega, Jack McDevitt, Ace, $23.95, 448 pp. (ISBN: 0-441010466).

Red Thunder, John Varley, Ace, $23.95, 411 pp. (ISBN: 0-441-01015-6).

Drowning World, Alan Dean Foster, Ballantine Del Rey, $23.95, 296 pp. (ISBN: 0-345-45035-3).

Berserker's Star, Fred Saberhagen, TOR, $24.95, 368 pp. (ISBN: 0-765-30423-6).

Cowboy Feng's Space Bar and Grille, Steven Brust, Orb (TOR), $13.95, 297 pp. (0-765-30664-6).

The Year's Best Science Fiction, Twentieth Annual Collection, Gardner Dozois, ed., St. Martin's, $19.95, 688 pp. (ISBN: 0-312-30860-4).

American Beauty, Allen Steele, Five Star, $25.95, 242 pp. (ISBN: 0-7862-5339-8).

Custer's Last Jump and Other Collaborations, Howard Waldrop, Golden Gryphon, $24.95, 254 + x pp. (ISBN: 1-930846-13-4).

Beyond the Last Star: Stories from the Next Beginning, Sherwood Smith, ed., SFF.NET (3300 Big Horn Trail, Plano, TX 75075; www.sff.net), $14.95, 331 pp. (ISBN: 0-9669698-5-5).

Bradbury Stories: 100 of His Most Celebrated Tales, Ray Bradbury, William Morrow, $29.95, 890 pp. (ISBN: 0-06-054242-X).

Jack McDevitt has established a reputation as an inventive and satisfying writer. I first reviewed him here in April 1995, with *The Engines of God*, which began the Priscilla Hutchins series. Hutchins is a starship captain ferrying Academy researchers to interesting spots around that portion of the galaxy explored by humans. She sometimes feels rather like a bus driver, but she has a very un-bus-driverish talent for solving problems and pulling chestnuts out of fires, as we saw in the next two volumes, *Deepsix* (April 2001) and *Chindi* (April 2002). Now, in **Omega**, she has retired from the front lines to be the Academy's assistant operations director. She has a husband now, you see, and a child, and she's perfectly happy to let others drive the bus and solve the problems.

Except . . . Humans are almost entirely alone in the galaxy. Life-bearing worlds are scarce, intelligence scarcer, and star-faring civilizations quite absent. Perhaps that absence is explained by an alien force—the Omega Clouds—that hates straight lines and tours the galaxy seeking and destroying them, and the civilizations that tend to create them. No one knows what the omegas are or who made them, but one is on course for Earth. It will arrive in about a thousand years.

You'd think people would be pretty worked up about that, but to most it's a problem for their remote descendants. To a few, such as David Collingdale, who has watched an omega destroy the ruins—"the most majestic series of structures [he] had ever seen"—on Brinkman IV, better known as Moonlight, they are a personal affront.

Meanwhile, new star probes are

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bringing in views from distant parts of the galaxy, and one of the stranger things they're spotting are nova-like flashes in different colors.

An exploring ship spots a strange object the size of an asteroid, but decorated with colossal spikes, just the sort of thing an omega attacks on sight. Six and a half kilometers in diameter, counting the spikes, it's drifting along in front of an omega, slightly slower than the destructive cloud. When the ship's crew drills a hole in the side of a spike . . . no more crew, no more ship, no more "hedgehog."

Another omega changes course, heading toward a star no one has ever checked for planets. Why? The best guess is that it has spotted straight lines, a civilization. And it's so far away that there is very little time to investigate. Hutch details the *Jenkins*, due to return home, to take a first look, and then scrambles to mount an expedition charged to save the natives, if any and if possible, and to try out various methods of decoying the omega away.

The *Jenkins*, of course, finds natives. They look funny, but they seem pretty sane in all respects but one: as soon as they get their first glimpse of a human being, they flee screaming! And Digby Dunn just isn't that ugly—or so says the lady he loves, Kellie Collier, captain of the *Jenkins*.

So Digby plants pickups so the linguists on the follow-up ship can start figuring out the language. Collingdale abandons his fiancée to join the expedition. And the race is on. Can they get the Goompahs to listen rationally? Can they deflect the omega? And can they figure out what the heck the hedgehogs are all about?

If you expect McDevitt to toss in some remarkable derring-do as he did in *Deepsix* and *Chindi*, forget it. That's Hutch's department, and she's riding a desk now. But there is plenty of excitement, some sympathetic characters to follow, and an answer to a puzzle McDevitt first posed almost a decade ago. If you've enjoyed the earlier novels in the series, you won't want to miss this one.

I wonder if it's something in the water? Three columns ago I covered Ralph Roberts's *The Hundred-Acre Spaceship*, in which home-grown tech and a small corps of loonies took a chunk of real estate into space. Now it's John Varley's **Red Thunder**, with loonies and home-grown tech and—well, not real estate, but would you believe a bundle of surplus tank cars?

Begin in Florida, where a couple of twenty-somethings who didn't do too well in high school but nevertheless dream of becoming astronauts are struggling to prepare themselves for college. Manny's family runs the flea-bag Blast-Off Motel. His girl-friend Kelly is the heiress to an obnoxious luxury car dealer. Dak is a car freak, with a souped-up pickup named *Blue Thunder*. This is not perhaps the most studious combo, but there they are, racing down the Daytona beach, having a high old time . . . and they run over a drunk.

Well, not really. But there he is, passed out in the sand and about to get washed out on the tide if no one pops his skull with a tire. So they check his wallet, find out where he lives, and take him home. Turns out he's an ex-astronaut named Travis Broussard, so thoroughly disgraced that it takes a bit of research to find out what sort of hero he is. He has a weird little sidekick, too, a guy named Jubal (perhaps with a nod to Heinlein) who turns out—once Travis and the kids get to be friends—to be a strange sort of Cajun genius. His latest invention looks like a soap bubble, except Jubal can twist his gizmo like so and inflate it, and when he pops it, there's an almighty boom as the world rushes to fill the vacuum inside it. If he pinches it way down to BB size, anything inside gets scrunched to quarks, and he has a colossal energy source.

Naturally, they decide the govern-

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ment is not to be trusted. Perhaps they read the Roberts book. So they start playing around, and once Jubal calculates that the Mars mission is about to go bust, they start putting their spaceship together. It helps that Kelly has a trust fund, but even so, and even doing things as cheaply as possible, they almost don't succeed.

But they do, and both reader and crew have a great deal of fun along the way. It's a shame that Varley is not more productive—his last book was *The Golden Globe*, which I reviewed way back in April 1999. Before that, it was *Steel Beach* (March 1993). I hope we don't have to wait another four or five years for the next.

Alan Dean Foster's **Drowning World** is set in his long-running Humanx Commonwealth, but on a new world, Fluva, where it rains copiously and almost eternally, so that the scenery resembles that of the Amazonian Pantanal. The humans have a base there, administered by Lauren Matthias, from which bioprospectors search for profitable fungi and other creatures. There is a rather belligerent native species, the Sakuntala, given to wars among tribes. The Deyzara are a more peaceful species, brought in centuries past as workers. They feel pretty native now, but since their birth rate is greater than that of the Sakuntalans, the latter are more than a little resentful. Some are, anyway, and some are quite willing to countenance a war that would drive the aliens away.

So meet bioprospector Shadrach Hasselemoga, an obnoxious, abrasive individual who looks like a much better target for aggression than the Deyzara. He's just lifted off in his ship to go prospecting, and all is well—but not for long. His ship goes down, and even its distress beacon doesn't work. Unfortunately, the last signal was from the middle of the Visiiviisii wilderness, so wild, so predator-rich, and so soggy that there is no hope that anyone can walk home.

It falls to Lauren Matthias to send a rescue mission, consisting of a Sakuntalan and a Deyzaran. She understands the potential friction, but these are good fellows. Off they go, and their ship falls off the map too.

Meanwhile the Sakuntalan tribes are mobilizing. Someone is supplying them with arms. A bit of detective work reveals suspicious activity around the missing ships when they were in the shop. And the missing trio is in fact walking out of the Viisiiviisii. There are predators to deal with, booby-traps to watch out for, and Shadrach has the strange sensation that something is watching him.

What's going on? The Commonwealth has its villains, but I'll say no more. *Drowning World* is competent and fun, as Foster delivers quite often. And the problems that irritate me most—the copyeditor should have caught the misuses of "proscribed," the confusion of "indigenous" and "indigenes," and the floral anatomy gaffe (pistils don't have anthers)—are not enough to spoil the enjoyment.

Fred Saberhagen's Berserkers have been raging across the galaxy for almost forty years by one count and for millennia by another. Saberhagen started writing about them in the '60s, and they have become his trademark theme: Self-reproducing, robotic killing machines, created by an ancient species to fight a war and programmed to destroy all life. They did their job, and then they turned on their makers—who were, after all, life—and exterminated them. And in due time, they encountered humans. Fortunately, despite the loss of whole worlds and billions of lives, humans have proved able to hold their own and even beat back the threat. We are, after all, the True Lords of the Universe!

Hey, remember, this got started in the days when SF was loaded with human supremacist fiction. White, male supremacist was more than a bit passé,

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and American or Western supremacist was (and is) a bit gauche. But human supremacist was okay. It also satisfied the readers' wish to feel superior to an implacable universe, which—the dinosaurs would tell you if they only could—is more than a little silly. We can try, and we can prevail for awhile, but there are no guarantees that we will continue to prevail. Nature has some awfully big guns!

You say Berserkers aren't a force of nature? True, they didn't start that way. But they are now, as much a feature of the galaxy as any asteroid strike or supernova. The difference is that these guys really are out to get you.

Berserker's Star is the latest installment in the continuing saga. Its protagonist is once more Harry Silver, hauling cargo in his starship, *Witch of Endor*. When he gets to Hong's World, he finds it in the throes of evacuation (a supernova is about to fry it). He is immediately approached by three potential passengers: Lily, whose husband has run off with a strange sect to the stranger world of Maracanda, and two gentlemen with urgent business on the same world. Will he take them? And please pay no attention to the Space Force and Templar demands that Silver go nowhere near that world!

Sure he will. And when the gents try to hijack the *Witch*, he's ready for them. Since he has a thoroughly illegal c-plus cannon onboard, he's also ready for the Berserker that tries to nab him. And when he gets to Maracanda with Lily, he finds a strange world indeed, balanced between a black hole and a neutron star, odd in shape and composition, and possessing under its surface deposits of strange minerals with stranger properties. There's even a gold-rush of sorts on, as he discovers when he runs into an old associate, the scalawag Bulaboldo.

It doesn't take long for Harry, Lily, and Bulaboldo to set off into the hinterlands in search of Lily's husband. Nor does it take long for Bulaboldo's own schemes to emerge. But there are rumors of goodlife, those twisted humans who collaborate with Berserkers, and it's not much longer before things begin to unravel in a big way. The Berserkers are on Maracanda too, and they have a scheme of their own. Somehow Harry must stop it! Even if he must say farewell to his distant wife and child, his beloved *Witch*, and life itself.

That should be teaser enough. Saberhagen, as usual, offers action and sweep enough for any reader. His characters are from stock, and some—like Lily—are endlessly irritating. Maracanda is nonsensical bafflegab. But the story moves right along, and if you crave more about Berserkers, this will quiet the pangs. If you agree with me that the Berserkers were much more interesting when the concept was new, you may also agree that *Berserker's Star* does not renew the charm.

I didn't read Steven Brust's **Cowboy Feng's Space Bar and Grille** when it first came out in 1990, though I heard of it and thought the title intriguing. Since Brust is a popular and excellent fantasy writer, TOR has reissued the book under its Orb imprint, and I have had a chance to make up for my earlier neglect.

Did you miss it too? Then get a copy, and enjoy. The titular lounge is a strange place, which always seems to be right on the spot when nuclear war breaks out. As the missiles strike, it vanishes, to reappear on another world in another time. The managers seem to take it all in stride. The musicians shake their heads, swear never to stray very far from the front door, and play on.

After each chapter, an "Intermezzo" hints that something larger is going on. There is talk of simulating an Old Earth setting of some sort, a Mr. Feng is involved, worlds are at stake . . . The chapters themselves begin with the sudden shift from Mars to New Quebec, an assassination attempt instigated by someone called "Sugar Bear," an accumula-

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tion of clues, and eventually a realization of what it's all about. There is scope, sweep, humor, and well-realized characters, everything it takes to give a book the sort of legs that get it reissued.

If you wonder why Brust is popular, buy and read. The light will dawn.

It's hard to believe that Gardner Dozois's famous **The Year's Best Science Fiction** anthology has been running for twenty years, but so it has. In that time, it has become a standard-bearer for the field, an essential annual purchase for fans and libraries, and a badge of honor for writers whose works are chosen.

In years past, Dozois has shown a tendency to favor his own magazine, and that remains strong, with eight of this volume's twenty-five stories from *Asimov's* (there's only one from *Analog*: Michael Swanwick's "Slow Life"). Other familiar names include Ian McLeod, Paul McAuley, Nancy Kress, Robert Reed, Maureen McHugh, Bruce Sterling, Gregory Benford, and more. All excellent writers, doing excellent work, bundled together in a package three times the size of most SF novels in the store. An excellent buy.

Is it really the year's best SF? In the past Dozois's picks did overlap with those of the Carr and Wollheim "Best of the Year" collections. He has also done a nice job of anticipating the Nebula and Hugo awards. However, this year's selections contain only one item on the final ballot for the Nebula Awards, Charles Coleman Finlay's "The Political Officer." It is thus clear that what Dozois considers the best is not necessarily what others call best.

But it's still very good. Don't miss this one.

Allen Steele gets the Five Star treatment with **American Beauty**, a collection of stories whose quality is well marked by "Agape Among the Robots." Two robot designers love each other but cannot admit it; every opportunity for a soft word becomes instead an occasion for put-downs and gibes. Their robots learn from their example, and for a while it looks like no one will want the company's product around the house. "Tom Swift and His Humongous Mechanical Dude" is an entertaining take on what the adolescent son of Tom Swift Jr. might be like today—a pretty irresponsible little dope fiend with a bent for rather swift one-liners.

And so on. Enjoy.

Howard Waldrop's mind takes some astonishing jumps and produces weird and wonderful stories, whether he is working by himself or with others. **Custer's Last Jump and Other Collaborations** offers the eight best (he says) of his collaborations, with Leigh Kennedy, Steven Utley, Buddy Saunders, George R. R. Martin, Bruce Sterling, and A. A. Jackson IV. The title story, with Utley, presupposes an alternate universe in which biplanes were available for the American Civil War. Crazy Horse and a few buddies join the Confederacy so they can learn to fly, do a pretty good job on the Yanks, and when the war ends, hide their planes away in a cave. A few years later, when Custer's troops are parachuting from dirigibles to wipe out the Indians, the planes find use again. Great fun, told in the guise of an academic treatise supplemented by a magazine article and extracts from Mark Twain's notes for a Huck sequel.

Some of the others are even stranger. So have fun!

Once upon a time, the on-line hangout for science fiction folk—editors, writers, and readers—was GENIE. But that service died a well-deserved death (it was astonishingly awkward, even for those days). Now the gang hangs out chiefly on sff.net, and perhaps it is not too surprising that—with so many writers and readers (or "customers") in the same "room"—someone should have the bright idea of getting the writers to

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provide stories for an anthology to be sold to . . . You got it.

The result was the first annual Dark-fire Anthology, *Between the Darkness and the Fire*, published in 1998. Even though it didn't issue from a Major New York Publishing House, the quality of the physical package and of the content were perfectly professional. Nothing amateurish about this one. And now the fifth volume in the series is available. It's **Beyond the Last Star: Stories from the Next Beginning**, and its premise is "What happens after the end of the universe?"

Meaningless question, you say? Well, maybe, but modern physics has given rise to some pretty weird speculations, and science fiction—not to mention fantasy—hardly has to stop where physics does. Nor does a writer have to play fair with the premise, as Stephen Eley does not with "The Malcontent," a wry tale that plays nicely with the complaint that technology now rules our lives. Robert E. Rogoff dodges with "virtual universes" in "How the God of Fire-and-Rain Came to Be." In "Impossible Odds," Linda J. Dunn has God go back to Genesis for a second try. Richard Parks is quite charming in "The End of the Dance, The Beginning."

Thus also sprach Gregory Feeley, Christopher Rowe, Leigh Kimmel, Vera Nazarian, Andrew Burt, and sixteen more. The content and style aren't what you see in *Analog*, but despite the excellence of this magazine, there *is* more worth reading out there.

Ray Bradbury hopes that you will agree that **Bradbury Stories: 100 of His Most Celebrated Tales** is "a grand collection." How can you not? Most of us have fond memories of the tales of Mars and October countries and so on. But there is much more to Bradbury's opus, from "The Kilimanjaro Device" to "The Toynbee Convector" to . . . well, almost a hundred more, far too many to name or describe. This is a fine retrospective for fans and libraries. ■

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BRASS TACKS

Dear Stan:

I immensely enjoyed the *Analog* serial "Shootout at the Nokai Corral" by Rajnar Vajra (Feb-May 2003). In this story, an octopus cloak is used to make people invisible. The cloak worked by projecting what is behind one to the front. I was stunned yesterday to find out that a project which gives this same illusion is well under way in the Tachi Lab at the University of Tokyo in Japan. For spectacular details about their method of Optical Camouflage—including movies!—see http://www.star.t.u-tokyo.ac.jp/projects/MEDIA/xv/oc.html, especially the fellow with the rain coat, with people and cars visibly moving behind him. Science fiction is always ahead, but in this case by only a few months!

Tom Schneider
Frederick, Maryland

The author replies . . .

I'm delighted you enjoyed the novel and thank you for bringing the Tachi Lab's intriguing work to my attention. This isn't the first time that actual research has been nipping at the heels of my fiction—a growing occupational hazard for SF writers who attempt to posit viable near-future technology. Of course, the lag time between writing and publication greatly increases the risk.

All I can do is try to keep *two* steps beyond science and hope that when the smoke clears, I'll still finish a half step ahead.

Good Morning,

Rajnar Vajra's "Shootout at the Nokai Corral" was positively fabulous. The story was really one of the best I've read in *Analog* and his prose was beautifully written.

As a long time reader of *Analog*, I thank you. I'd like to know more about the author. Any info you can share?

Now my husband is reading the story and I'm sure he'll pass it on as well.

Thanks again,
Terry Ring Schonwald

Our October 2000 issue contained Jay Kay Klein's Biolog of Rajnar Vajra.

Dear Dr. Schmidt,

Haven't enjoyed a serial like Rajnar Vajra's latest in a long time. But I must say the cuts you made in the first two parts make me think you were a fan of Hairbreadth Harry and the Perils of Pauline. Some cliffhangers. But a great serial. Haven't looked forward to a next issue like this for a long time.

Margaret & Don Manyette

Dear Dr. Schmidt,

I just got done reading the May 2003 issue, specifically Rajnar Vajra's "Shootout at the Nokai Corral." Mr. Vajra is an accomplished storyteller—one of the best to come along in a while—and I look forward to his works whenever they appear in *Analog*. I also wish to thank *Analog* for considering to publish this engrossing novel and just wish you had more space per issue to publish it in. I also wonder if Mr. Vajra has any plans for a sequel, or another story in that universe. (But I suppose all fans ask this just when an author thinks he/she has ended a story properly.) Please keep

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up the good work!

Ben Hadley
Ames, IA

The author replies . . .

I greatly appreciate your kind words, Mr. Hadley! And I do have plans to extend the story to other theme planets, and explore the causes of Earth's "global funk." These future projects depend on my success in finding a publisher willing to release "Shootout" as a novel—a challenging task with such an unusual work. I'm deeply grateful to Dr. Schmidt for his long-standing encouragement and allowing my tale to take up so much of *Analog's* limited space this year.

Gentlemen,

Because I like to devour a story whole rather than piecemeal and don't have the patience to wait for months before starting a story, I usually skip buying issues of your magazine that contain serials. After skimming the first few pages of "Shootout at the Nokai Corral" at the newsstand I made a rare exception. It was a good story, but after reading the so-called conclusion, I find that my first impulse to skip that issue (and the following three) was correct. I feel totally cheated, not so much by the author as by the editor. The premise of the story is good and the writing is fine, but this isn't a novella that can be serialized in four parts. It is just act 1 of a much longer novel! It's like getting 150 pages into a 300-page book and finding out that the rest of the pages are blank. You've done the author no favor by publishing an incomplete story. I assume that he will finish it some day and will publish the full novel. I, for one, will not buy it unless I find it on the remainder rack for half price. After all, I've already paid for half of it.

Tom Scharf
San Jose, CA.

I agree that publishing an incomplete story does no one any favors, but though we've had a great many comments about Shootout, *you're the only reader I've heard from who thought that it seemed incomplete. Most thought it wrapped up its bundle of action quite nicely, though it (like most good novels) obviously also sets up the possibility for sequels and other stories set in the same universe.*

Dear *Analog*,

[Re: "The Day the Track Stood Still," by John C. Bodin and Ron Collins, May 2003] I remember reading another Indy 500 story in *Analog* years ago. I don't remember the details, but I remember that I was disappointed because it didn't have the feel of racing. This one did. I even shed a small tear. But it's allowed—I'm a racer.

Ed McGuirk
Wayne NJ

Dear Dr. Schmidt,

I'm sure that most readers were already mentally shouting "what about computers?" at your [May, 2003] editorial long before you mentioned them. While you did mention that computers are doing better now than before and aptly compared their development to televisions, I believe that you missed an important aspect of reliability. We use consumer desktop and laptop computers in a way similar to how hot rods are used. We do lots of post-market customizing. This sort of post-market customization inherently places more of a burden on the consumer than does using a standard product.

In the early days of microcomputers, microcomputer advertising routinely specified bus standards such as S100 or Versa busses and other aspects of computers which are now grouped into fixed structures called "platforms." Thus, a great deal of the convergence that you write about has already happened. However, a great deal of nonstandardization continues to exist. Lack

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of standardization used to be one of the great attractions of the PC world over the Macintosh world which enforced a much greater degree of standardization. Today, "plug-and-play" and rather tighter integration has become more normative.

The reality is that you and *Analog* readers are surrounded by computers which effectively do not break. Computers are in just about every electrical appliance made these days. The Boeing 777 and the new Airbus are both flown by computers 24/7 with no provision for direct control. These new commercial aircraft can take off, fly to their destination, and land in a totally hands-off mode of operation. I was aboard a commercial flight a couple of years ago where the captain announced over the intercom that the computer landed the aircraft. The new joint services fighter will also fly under computer control at all times. In a very real sense, its pilots will not fly the plane, but will manage combat.

That said, in the long-term we can expect computers to "disappear" into the fabric of the world where they are simply parts of our daily lives and are used without specialized training much as we now use television sets and automobiles. The overall trend with computers is for them to become smaller, faster, cheaper, and more powerful. We should expect that the next cycle of computer development will "pervasively" embed them. This can include such things as adding microscopic computers to gallons of paint which can monitor activity inside a room and perform other tasks such as changing the color, shade, and texture of the wall. At that point, the individual computers are literally invisible to the naked eye.

Dr. Barbara Nostrand
Department of Computer Science
SUNY College at Potsdam
Potsdam, New York

Dear Stanley,

Your May editorial has induced me to write for the first time to an editor.

With regards to technology change, thirty years ago I used to think that if one had a good idea and it did not work (Physics violations excepted), try it again in six to ten years. It just might work as technology caught up. Now that has changed to "try again in three months."

I probably read the July 1971 blurb by John W. Campbell, though I do not remember it. In 1971, I had an employee who spent his evenings at Stanford playing some game in their computer science department. Early in 1972, he and a Junior Engineer who also worked for me at the time built maybe a dozen coin operated video games. He put them in a few bars in the Silicon Valley and when they started to collect quarters, quit work and started his own company.

The company name was Sysygy and his name is Nolan Bushnell. That original company became Atari, so that John W. Campbell's prediction of the quarter megabuck playing board may well have been one of the shortest predictions I have ever heard of.

In 1971, Nolan was actively working on the concept, his games were in bars in the San Francisco Bay Area by 1972, by 1973 he had a viable company building and shipping arcade games and he hired another former employee of mine, Al Alcorn, who designed and built the Pong game of which you probably allude to in your editorial. Which of course became the home video game and started that whole industry.

Talk about quick change!

Ed De Benedetti
Valencia, CA

Dear Stanley,

As I read your editorial titled "The Ground Floor," I was concerned by an off-hand comment included in the introductory paragraphs. My issue is with the attitude, which is all too prevalent today, reflected by "(if the guard looks the oth-

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er way) feel the actual objects. . . ." That attitude is "it is not wrong if I don't get caught." It places responsibility for morality in the hands of the police/officials/government. It implies that the rules are arbitrary, and that there is no consequence for violating them except the possibility of getting caught.

Rules sometimes appear arbitrary with no good reason to exist. But I find that most rules do have a good reason to exist, even if I can't initially see it. In the case you cite, the oils/dirt/moisture/salt left by a person touching a museum display can damage item so that at some time in the future after thousands or millions of touches, the item is destroyed, or at the very least needs to be carefully cleaned, which can be a major expense. Speeding, drunk driving, shoplifting, taking home office supplies, disclosing confidential information, and a myriad of other activities that are "okay if you don't get caught" have more or less serious consequences, whether you get caught or not.

The main consequence of "okay if you don't get caught" is the dilution of our sense of personal responsibility. Today the sense of personal responsibility in some people is so diluted that it is almost impossible to detect. I think your sense of personal responsibility is fairly strong based on prior writings, but it must not be full strength either.

Believe me, I am not holding myself up as perfect. I do my share of rule breaking when I think (probably erroneously) that a rule isn't really serious. It was the casualness of your remark and the realization of the general cultural attitude it reflects that stimulated me to write.

Thanks for a great magazine.

Robert S. Frye
Polk City, FL

Sigh. That was intended as a minor "joke in passing," not advice to be taken seriously. I agree with you that a sense of personal responsibility is one of the most important things there is, and one of the most neglected in our culture. My statement that you can *feel the objects if the guard looks the other way is literally true, and was not intended to suggest that you* may *or* should *do so. (I don't, by the way.)*

Maybe our grade-school teachers should have harped even harder on the distinction between can *and* may. *But it's also rather sad that it's become nearly impossible to say anything in jest without somebody reading something sinister into it. A culture needs a sense of humor, too.*

Dear Dr. Schmidt and Ms. Williams,

In the May Brass Tacks, Bruce M. Foreman deplored stringing multiple related novelettes across many months' worth of issues. I don't find that practice as unnerving as he does, but there's a related issue I hope you steer clear of. I'm referring to running the first section of a novel as a stand-alone novelette or novella, and then *never* running a follow-up. If you want the whole story, you have to buy the book—which generally isn't available yet. I want to read an entire work as the author conceived it. If I know that a piece is part of a greater whole because of your introductory blurb, I can skip it in favor of the novel, but that cheats me out dozens of pages of fiction that could have appeared in its place. Even worse is if I *don't* know what to expect and only catch on when a story ends leaving lots of narrative threads hanging.

Other than that, and a few minuscule typos, I'm a happy reader.

While I'm writing, let me ask a question. What happened to the practice of having a magazine cover illustrate a story that appears in the issue it fronts? It used to be that was the norm; nowadays it seems an exception. Was the change motivated by practical considerations like a shorter time from story acceptance to printing, or is it a philosophical change to allow you to pick compelling

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art regardless of the articles?

Keep up the good work. If you ever retire, I want your job.

Lee Schlesinger
Framingham, Mass.

We try never to run just the beginning (or any other excerpt) of a novel unless it really does stand alone as a story. Sometimes what you later come to see as the beginning of a novel was originally conceived only as a short story or novelette, and even the author didn't know there was going to be more until after the short piece was published! (My own Tweedlioop *is an example.)*

Our current practice is to commission an original cover illustrating a story in slightly over half of our issues. It would be nice to do it in every issue, but the economics of magazine publishing are not as favorable as they once were and the present policy lets us pay a more competitive rate for the original covers we do use. ■

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UPCOMING EVENTS Anthony Lewis

November is always a slow month for SF conferences, possibly due to the various harvest festivals that tend to be family gatherings.

30 October–2 November 2003
WORLD FANTASY CONVENTION 2003 at Hyatt Regency Washington on Capitol Hill, Washington, DC. Guests of Honor: Brian Lumley, Jack Williamson. Publisher Guest of Honor: W. Paul Ganley. MC: Douglas E. Winter. Registration: $120 until 31 July 2003, $35 supporting. Info: WFC 2003, 7113 Wayne Drive, Annandale VA 22003-1734, info@worldfantasy2003.org, www.worldfantasy2003.org

8 November 2003
CON*CEPT 2003 (Montreal SF & Fsy Conference) at Days Inn Hotel Downtown Montreal. Anglophone Media Guest of Honor: Claudia Christian. Francophone Media Guest of Honor: Frédéric Ouellet. Artist Guest of Honor: Heidi Taillefer. Writer Guest of Honor: Dave Duncan. Registration: CDN18 until 15 September 2003, CDN25 at the door. Info: Post Office Box 1186, Place du Parc, Montreal, Quebec H2X 4A7. cathypl@sympatico.ca www.monsffa/concept2003.html or www.monsffa/concept2003f.html

12–14 December 2003
PHILCON 2003 (Philadelphia area SF conference) at Marriott City Center, Philadelphia, PA. Principal Speaker: Jack McDevitt. Artist Speakers: The Brothers Hildebrandt. Special Guest: Peter David. Registration: to be announced. Info: Philcon, Post Office Box 126, Lansdowne, PA 19050-0126, registration@philcon.org, www.philcon.org

2–6 September 2004
NOREASCON 4 (62nd World Science Fiction Convention) at Sheraton Boston, Marriott, and Hynes Convention Center, Boston, MA. Guests of Honor: William Tenn, Terry Pratchett, Jack Speer, Peter Weston. Registration: Attending USD160 Supporting USD35, Child USD105. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition—the works. Info: Noreascon 4, Post Office Box 1010, Framingham, MA 01701.FAX: +1.617.776.3243. info@noreascon.org. www.noreascon4.org

Running a convention? If your convention has a telephone number, FAX number, email address, or Web page URL, please let us know so that we can publish this information. We must have your information in hand SIX months before the date of your convention.

Attending a convention? When calling conventions for information, do not call collect and do not call too late in the evening. It is best to include a S.A.S.E. when requesting information; include an International Reply Coupon if the convention is in a different country. ■

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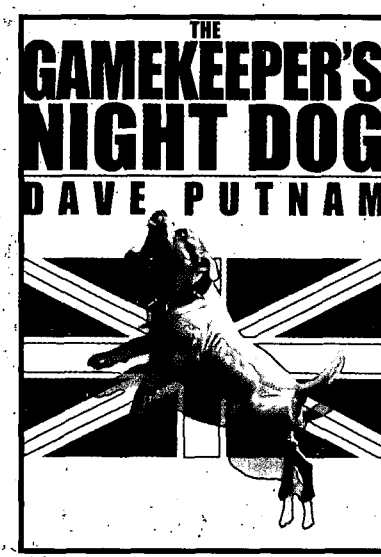
What if The Sun Had Never Set on Britain's Empire?



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